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APPENDIX TO THE JOURNALS

OF THE

SENATE AND ASSEMBLY

OF THE

FORTY-SECOND SESSION

OF THE

LEGISLATURE OF THE STATE OF CALIFORNIA

VOLUME VII

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO
1917

*328.794
C12:42 ^{9}
125059

VOLUME VII.

1—Report of State Mineralogist, 1913–1914.
2—Report of State Oil and Gas Supervisor, 1915–1916.
3—Report of Bureau of Labor Statistics, 1915–1916.
4—Report of State Civil Service Commission, 1916.
5—Report of State Tax Commission, 1917.
6—Report of State Purchasing Department, 1916.
7—Report of Board of State Harbor Commissioners, 1914–1916.
8—Preliminary Report California Historical Survey Commission, 1917.
9—Report of State Board of Embalmers, 1915–1916.

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CALIFORNIA STATE MINING BUREAU
FERRY BUILDING, SAN FRANCISCO
FLETCHER HAMILTON State Mineralogist

San Francisco] [July, 1915

REPORT XIV

OF THE

State Mineralogist

Mines and Mineral Resources

OF PORTIONS OF

CALIFORNIA

Chapters of State Mineralogist's Report
Biennial Period 1913-1914

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO
1916

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ADMINISTRATIVE STATEMENT.

During the 64th and 65th fiscal years, the State Mining Bureau has endeavored to place itself in a position where the department will be of greater actual economic service to the mineral industry of this State, and to its many allied industries in general. In order to do this, it was first decided to rearrange and modernize the quarters in the Ferry Building in which the Bureau has been established for many years. A consolidation of certain of the departments was also made at the same time. It is pleasing to relate that much favorable comment has been made on these changes and their accompanying results.

The present State Mineralogist, Fletcher Hamilton, was appointed by Governor Hiram W. Johnson, January 21, 1913, and is "the successor in interest of the Board of Trustees of the State Mining Bureau and the State Mineralogist, under and by virtue of that certain act, * * *, approved March 23, 1893," under the amended Mining Bureau Act, approved June 16, 1913, and in effect August 10, 1913 (Stats. 1913, Chapter 679).

Complete general report.

The first work undertaken was a complete general report upon the mines and mineral resources of the State. As the annual mineral output of nearly one hundred million dollars is maintained by the production of over forty separate substances from fifty-six counties, it meant that field assistants would have to cover the entire area of California.

In order to accomplish this work, seven assistants qualified through technical education and practical experience were appointed. For the biennial period, reports on twenty-seven of the counties have been printed and are on sale in the form of advanced chapters. These advanced chapters are here combined in the present volume which has been designated, Report XIV of the State Mineralogist. In addition field work was completed in seven other counties, the reports for which will be printed during the succeeding biennial period.

County mineral maps.

Along with this work a complete set of county mineral maps of standard size and scale is being prepared. These maps will show the location of all known mineral properties as well as being up to date in other particulars.

Petroleum report.

Because of the great economic and commercial value of our petroleum resources, and because of the considerable dependence of California industries upon this fuel, a special report was deemed particularly advisable at this time. The infiltration of water into the oil sands presents a vital problem to the life of California's oil reserves, and this also was a prime factor in the making of the report. An especially well fortified assistant was obtained for this work who, with one other geologist, spent practically twelve months in a report which goes into every phase of the petroleum industry. This will be issued as Bulletin No. 69, "Petroleum Industry of California," accompanied by a folio of eighteen areal, structural and geological maps. During the course of this work, preliminary reports on the water conditions in the Coalinga and Midway-Sunset fields were issued and distributed as soon as investigation in those fields had been made.

Petroleum legislation.

Investigation and study of the water conditions in the oil fields having shown the necessity for legislation to force the proper protection of this resource, the State Mining Bureau is taking active part in cooperation with the associations in the different fields to present to the Forty-first Session of the Legislature a bill which is expected to solve as far as possible the difficulties.

Museum and laboratory.

The Museum of the Bureau is a very popular institution, and many thousands of visitors pass through it annually. The laboratory is of inestimable value to the industry, and as mineral identifications are made free of charge, many people, prospectors as well as engineers and scientists, take advantage of the high class of work maintained.

Library and statistical departments.

The library and reading room have been enlarged and the accommodations increased. As the library is rated the best mining library in the West, it is in use constantly. The scope of the statistical department is being broadened, and its reports now include more detailed information than formerly.

Throughout, we believe it is fair to state that the attitude of the mining public toward the State Mining Bureau has substantially improved.

Publications.

During the biennial period to June 30, 1914, there were published and distributed two annual statistical bulletins, namely: No. 65 and No. 68. These were very painstakingly compiled, and have had a wide distribution.

Bulletin 66 on the Mining Laws of California and the United States was a very popular publication, and an edition of 5,000 copies was completely exhausted in six months.

Bulletin 67, on the Minerals of California, is a very comprehensive report on the occurrence and description of every mineral species known in California, and is a work which is authoritative on this subject.

Geologic map.

One of the most important works which should be done by this department is the compilation and verification of a complete geological map of the State. It will be of scientific as well as economic value, and will be of great use in the advanced schools, colleges and universities, not only of the State of California, but of the United States. A beginning has been made on such a compilation.

Future plans.

Regarding the scope of future work of this Bureau: As a little reflection will show, with an annual production worth nearly one hundred million dollars, from over forty different mineral substances, there are many avenues in which constructive work may be applied.

Because of the economic conditions brought about through the European war, and the probability of the United States being forced to rely upon its own mineral resources, and because this country is a potential producer of almost every mineral substance used in the industrial world, the possibilities of future development can be foreseen. A brief review of the subject reveals the fact that in several instances California is the sole source of domestic supply, and with but few exceptions this State contains deposits of every mineral produced elsewhere in the United States. At the present time the conditions in the world's markets are such that the time is opportune for California to take its place in an enlarged field of use for its industrial and structural materials. We have in this State a large number of deposits of various minerals which make up this branch, and by making special effort toward the development of these materials, this Bureau can be of special service to the mineral industry.

Statistics of gold production show a falling off in some countries in the production of the precious metal. In order to maintain the proper equilibrium between the money base and our credit system, every effort should be made to augment our gold output. California, in addition to her present production, which leads all other states in the Union, has still a great latent gold resource, which, with the proper development could alone make up an appreciable part of the world's deficit in production. By a proper study of the ancient gold-bearing gravel channels and hydraulic gravel deposits the problems confronting the development and operation of these deposits can be solved.

The general report which has been made for the twenty-seven counties represented in this present volume will be pressed to completion in the other counties with all dispatch possible during the immediate future; and there is no doubt of its value to the industry, as the demand for this work has been incessant.

With the assistance of funds from the California Commission, an exhibit is to be installed by the State Mining Bureau, in the Palace of Mines at the Panama-Pacific International Exposition; and an information service to visitors maintained. Copies of our annual statistical bulletin will be distributed both there and at the Panama-California Exposition at San Diego.

Financial Statement.

Sixty-fourth Fiscal Year. July 1, 1912, to June 30, 1913.

Receipts.

Balance from sixty-third fiscal year	$20 30	
Appropriation, sixty-fourth fiscal year	20,000 00	
		$20,020 30

Disbursements.

Geological salaries	$883 33	
Bureau salaries	11,600 50	
Traveling expenses	1,673 10	
Rent	1,485 00	
Laboratory	112 84	
Library	657 13	
Museum	31 17	
Postage	411 24	
Sundries	3,165 12	
		$20,019 43
Balance of fund note expended		87
		$20,020 30

Sixty-fifth Fiscal Year. July 1, 1913, to June 30, 1914.

Receipts.

Appropriation, sixty-fifth fiscal year		$40,000 00

Disbursements.

Geological salaries	$12,060 00	
Bureau salaries	13,775 80	
Traveling expenses	6,915 63	
Rent	1,800 00	
Laboratory	112 07	
Library	494 08	
Museum	81 00	
Postage	821 35	
Sundries	3,581 20	
		$39,641 13
Balance of fund not expended		358 87
		$40,000 00

Mineral production for 1913.

The mineral production of California for the calendar year 1913 is here given to show the diversity and importance of our wealth in this regard and its commercial distribution by counties.

The following table shows the value of minerals produced in California by substances during the year 1913:

Substance	1913	Substance	1913
Asbestos	$1,175	Marble	$113.282
Barytes	3,680	Mineral paint	1,780
Bituminous rock	78,479	Mineral water	599,748
Borax	1,491,530	Natural gas	1,053,292
Brick	2,915,350	Petroleum	48,578,014
Cement	7,743,024	Platinum	17,738
Chromite	12,700	Potash	----------
Clay	261,273	Pumice	4,500
Coal	85,809	Pyrites	218,537
Copper	5,343,023	Quartz rock	7,756
Feldspar	7,850	Quicksilver	630,042
Fuller's earth	3,700	Salt	462,681
Gems	13,740	Sand, glass	14,143
Gold	20,406,958	Sandstone	27,870
Graphite	25	Silver	832,553
Gypsum	135,050	Soapstone	6,150
Infusiorial earth	35,968	Soda	24,936
Iron ore	4,485	Stone, miscellaneous	6,168,020
Lead	160,202	Tungsten ore	234,673
Lime	528,547	Zinc	64,845
Limestone	274,455		
Magnesite	77,056	Total	$98,644,639
Manganese	----------		

The following table shows the value of the mineral production of the various counties in the State for the year 1913:

County	1913	County	1913
Alameda	$844,217	Plumas	$143,698
Alpine	541	Riverside	2,071,969
Amador	3,013,180	Sacramento	2,925,706
Butte	2,533,940	San Benito	514,995
Calaveras	2,042,901	San Bernardino	2,486,100
Colusa	48,481	San Diego	315,694
Contra Costa	1,962,640	San Francisco	110,551
Del Norte	2,514	San Joaquin	165,157
El Dorado	67,723	San Luis Obispo	63,675
Fresno	8,438,810	San Mateo	215,371
Glenn	27,776	Santa Barbara	3,636,288
Humboldt	471,052	Santa Clara	311,383
Imperial	95,054	Santa Cruz	1,816,805
Inyo	1,942,309	Shasta	6,212,344
Kern	28,406,193	Sierra	1,010,976
Kings	1,335	Siskiyou	309,986
Lake	125,829	Solano	1,839,721
Lassen	2,382	Sonoma	239,037
Los Angeles	5,833,298	Stanislaus	272,249
Madera	371,867	Sutter	-----------
Marin	278,453	Tehama	2,442
Mariposa	246,079	Trinity	435,142
Mendocino	9,450	Tulare	119,760
Merced	35,329	Tuolumne	1,198,383
Modoc	6,875	Ventura	924,972
Mono	184,428	Yolo	-----------
Monterey	178,679	Yuba	2,507,139
Napa	1,186,353	Unapportioned	17,738
Nevada	2,950,367		
Orange	6,948,495	Total	$98,644,639
Placer	520,808		

FLETCHER HAMILTON,
State Mineralogist.

December, 1914.

PART I.

The Counties of

Amador County
Calaveras County
Tuolumne County

By W. B. TUCKER, Field Assistant

INTRODUCTION.

The Mother Lode District of California is one of the oldest, and is the most important quartz gold producing district in the state at the present time. Of this area, the three counties of Amador, Calaveras and Tuolumne, covered in the following report, form the central part. Geographically they are near the center of the state, and east of San Francisco, their western portions being in the foothills on the eastern flank of the Sacramento and San Joaquin valleys; while their eastern ends reach into the high altitudes of the Sierra Nevada Mountains. The principal mineral development has been in the western half, the main industry of the higher mountainous areas being stock raising. The western part is fairly well served with railroads.

This report represents the results of some five months' field work in the territory described, which was covered quite thoroughly. We have here endeavored to record all of the mineral resources and properties which have been the subject of commercial exploitation.

Acknowledgment is here made of the uniform courtesy of the operatives, and for the assistance rendered by others during the preparation of this report.

AMADOR COUNTY.

Field work in September, 1914.

Since the publication of the last report of the State Mining Bureau on the mineral resources of the State, there has been a general revival of interest in mining in this county, especially on the Mother Lode, where are located some of the deepest mines in the State. The following properties are under steady operation: Kennedy, Argonaut, South Eureka, Central Eureka, Keystone, Original Amador, Bunker Hill, Fremont, and Plymouth mines.

During the past year the old Empire and Pacific mine at Plymouth has been reopened by the Plymouth Consolidated Gold Mines Company, Limited, of London, England.

At this property a new mill has been constructed which is quite a departure from the present milling operations on the Mother Lode, where by means of heavy stamps, crushing through coarse screens, and regrinding with Hardinge mills the stamp duty has been increased from 5 tons to 15 tons per stamp. Then by means of classification an increased extraction is made. This new departure in milling will no doubt be the means of handling a larger tonnage of low-grade ore at a profit. Another mine of interest that has resumed operations is the Keystone, which has a reported past record of production of $17,000,000. The Treasure mine has been reopened, and after extensive development enough ore has been developed to assure that it will soon be on a producing basis. Besides the interest in gold mining, there has been an extensive development in the clay deposits in the neighborhood of Ione, and a large tonnage of this material is being shipped to the different pottery works in the State for the manufacture of terra cotta, sewer pipe, tile and pottery, while quite a tonnage of fire clay is made into fire brick by the Ione Fire Brick Company. Aside from a small amount of prospecting there is but little activity on the copper belt.

Transportation facilities.

Communication by railroad with this county is especially good, the mines being within easy communication with San Francisco, Stockton, and Sacramento by means of the Southern Pacific Railroad from Galt to Ione and then over the Amador Central Railroad to Martell, which is within 2 miles of Jackson on the south and Sutter Creek on the north. There are good auto and wagon roads from Martell and Carbondale stations to the different mines.

Geology.

There are three distinct lodes in Amador County. The principal one is the Central or Mother Lode belt, about 6 to 10 miles east of which is the East belt, occurring in the granite area near the Pioneer and Defender districts. About 8 miles west of the Mother Lode belt at Ranlett is the copper belt running in a northwesterly and southeasterly direction through the county, the ores of which occur in the form of copper sulphides associated with iron pyrites in amphibolite schist, and diabase.

The quartz veins of the Mother Lode, may be divided into three classes: those occurring only in the black clay slates of the Mariposa beds, those occurring on the contact of the black slates on the west, and diabase on the east, and those in the amphibolite schist. The Plymouth Consolidated mines are an example of the first; the Keystone, Kennedy, Argonaut, South Eureka and Central Eureka are the second; while, the Zeila and Hardenburg are of the third class. The general strike of the veins is from north and south to a northwesterly and southeasterly direction, with a dip of from 50 to 70 degrees to the east.

The veins are in the form of quartz and stringer leads, with as a rule a heavy gouge on the footwall.

Storage of tailings.

The mines along the lode have been put to a great expense in having to provide means for the storage of tailings. The Kennedy mine has installed a series of tailings elevators, for elevating the tailings from the mill to a storage reservoir, where they are impounded by a concrete dam 540 feet long and 50 feet high. All the other mines are buying land and building storage dams to take care of their tailings.

Production.

The reported records of production of the following mines on the Mother Lode in Amador County are:

Kennedy	$10,000,000
Argonaut	4,000,000
Oneida	2,500,000
South Eureka	2,000,000
Central Eureka	2,000,000
Old Eureka	20,000,000
Wildman & Mahoney	3,500,000
Lincoln	2,000,000
South Spring Hill	2,000,000
Keystone	17,000,000
Bunker Hill	3,000,000
Fremont	5,500,000
Plymouth	12,000,000

Amador County's mineral resources consist of asbestos, brick, chrome, clay, coal, copper, gold, lime, sandstone, silver, soapstone.

AMADOR COUNTY—Table of Mineral Production.

Year	Gold	Silver	Coal		Copper		Clay		Lime		Limestone		Marble		Stone industry		Miscellaneous and unapportioned	
	Value	Value	Tons	Value	Pounds	Value	Tons	Value	Barrels	Value	Tons	Value	Cubic feet	Value	Kind	Value	Kind	Value
1880	$1,495,053	$1,953															Unapportioned, 1900-1909	$312,422
1881	1,450,000	1,500																
1882	1,500,000																	
1883	1,590,000																	
1884	2,000,000	2,000																
1885	2,145,591	3,700																
1886	1,874,062	6,136																
1887	1,979,956	2,069																
1888	1,750,000	3,500																
1889	1,560,975	6,398																
1890	1,459,952	9,357																
1891	1,395,982	13,895																
1892	1,210,383	8,008																
1893	1,505,973	5,230																
1894	1,331,916	280	15,280	$23,020			2,500	$3,000					25,941	$35,826				
1895	1,391,929	1,089	21,323	31,985	16,500	$1,650	9,960	10,285					4,864	6,566				
1896	1,523,351	3,767	19,775	29,662	30,000	3,000	8,413	27,825					4,389	5,415				
1897	1,324,472	3,477	20,000	25,000			3,492	9,540					3,864	6,280				
1898	1,806,363	1,742	18,500	29,550	3,000	300	7,197	8,297					2,850	3,594				
1899	1,544,868	6,902	18,500	23,125			10,700	10,900					4,582	7,925				
1900	1,373,788	14,915	27,477	41,215	220,000	34,100	11,500	9,100					4,103	5,891				
1901	1,823,827	7,444	25,000	30,000	52,000	8,190	10,050	7,100					2,945	4,630	Brick	$7,000		
1902	1,629,151	2,686	5,450	10,912	130,000	14,620	12,723	13,728					6,300	8,016				
1903	1,609,744	4,336			10,000	900	22,000	19,460					3,074	5,379				
1904	2,060,574	4,055			14,000	1,400	20,608	10,770	1,700	$1,700			4,785	6,558			Sand, glass	750
1905	2,445,815	17,930			10,000	1,560	21,775	20,000	1,000	1,500			2,703	3,950				
1906	2,260,373	14,579			8,648	1,669	26,789	28,119	1,000	1,200								
1907	2,116,182	13,515			5,300	1,020	12,465	13,992			1,000	$1,200						
1908	1,876,175	13,239			53,940	3,440	23,322	25,369	800	960	1,000	1,375			Brick	61,600	Asbestos	1,000
1909	2,298,785	16,701			288,472	36,641	33,563	32,724	1,200	1,440					Brick	28,572	Asbestos Chrome	200 332
1910	2,646,246	20,916			151,484	14,383	39,446	49,339	1,400	1,680	1,000	1,500			Brick Sandstone Soapstone	30,000 5,600 6,000		
1911	2,832,395	28,899			227,848	28,481	43,352	37,359	1,200	1,500					Brick Sandstone	20,000 45,000		
1912	2,796,194	32,037			176,608	28,975	35,100	36,856	800	1,040					Sandstone Soapstone	3,000 2,100	Quartz Sand, glass	3,556 670
1913	2,901,898	18,097			19,023	2,949	39,678	38,653	1,000	1,200					Brick Sandstone Soapstone	30,000 2,500 2,420	Other minerals	11,237
Totals	$62,511,953	$290,352	171,305	$244,469	1,416,823	$183,281	394,633	$412,416	10,100	$12,220	3,000	$4,075	70,400	$100,030		$243,792		$336,167

Total mineral production of Amador County from 1880 to 1913, inclusive:

Clay	$412,416
Coal	244,469
Copper	183,281
Gold	62,511,953
Lime	12,220
Limestone	4,075
Marble	100,030
Stone industry	243,792
Silver	290,352
Miscellaneous and unapportioned	336,167
Total	$64,338,755

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ASBESTOS.

Mace Asbestos Mine. It is 2½ miles east of Ione, on Sutter Creek; some veins and stringers of the chrysotile asbestos occur in a dark green serpentine along the contact with the black slates. Several small open cuts have been made on this asbestos. Mrs. A. Mace, of Ione, owner.

CLAY PRODUCTS.

Description of Carbondale and Ione Area. In the area about Carbondale and Ione are extensive deposits of high-grade clays. Fine plastic potter's clay and fire clays occur in unlimited quantities. There is also a highly sandy clay, and associated with these are plastic variegated clays adapted to terra cotta, sewer pipe and drain tile, and similar uses. A large part of the extensive clay area around Carbondale occurs in an old Spanish grant of 34,000 acres, which is now controlled by the Pacific Improvement Company, from whom the clay lands are leased.

Ione Coal and Iron Company's clay banks, Ione, Amador County, California.

N. Clark & Sons, 116 Natoma street, San Francisco, obtain clay for their factory in Alameda from a large pit on the Ione-Sacramento road, 2½ miles north of Ione; M. R. Bacon is their superintendent at Ione. The clay is soft, smooth, plastic, and free from grit. It has a light blue color in the interior of the bed, but changes to a snow white when dried. It occurs in a massive bed, from 20 to 30 feet thick, and is overlaid by from 3 to 10 feet of variegated, yellowish, red and white sandy clay that is stripped off and thrown to waste. The white clay is quarried in large quantities at very little expense. From the pit it is hauled by wagons to storage sheds on the railway siding. Fifteen men employed.

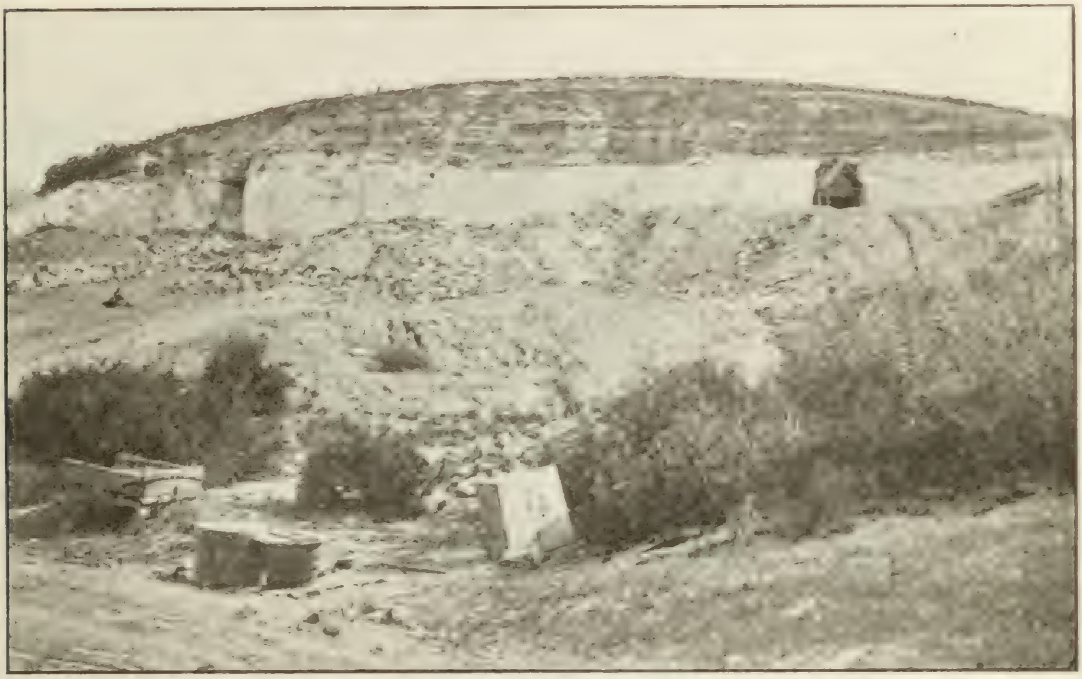
A. V. Clark Clay Banks. Situated 2 miles north of Cardondale, where a fire sand is obtained, which is a white clay of the Ione formation containing a large percentage of silica. A bank of white clay 20 feet thick, with 3 feet of overburden has been developed. A large amount is being quarried and hauled to Carbondale, where stored in sheds on the railroad. This product is used for making terra cotta and white brick. Five men are employed. N. Clark & Sons, 116 Natoma street, San Francisco, Cal., owners. M. R. Bacon, of Ione, superintendent.

N. Clark & Sons clay banks, Ione, Amador County, California.

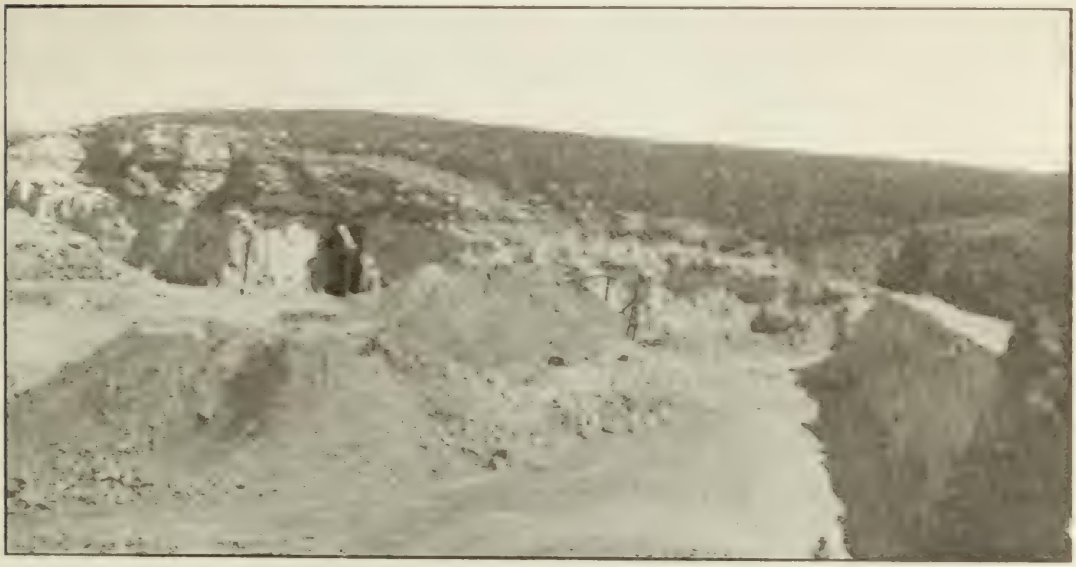
Garden City Pottery Clay Banks. These banks are located 2 miles north of Carbondale. This pit furnishes a soft, plastic, refractory clay, free from grit, having a light blue color when first dug which changes to white when dried. It occurs in a bed 6 to 14 feet thick, overlain by from 1 to 6 feet of yellow, sandy clay. Clay is hauled by wagon to storage shed at Carbondale Station. Garden City Pottery Company, 560 North Sixth street, San Jose, Cal., owner. J. Newman, of Ione, superintendent.

Ione Coal and Iron Company Clay Banks. This company has developed a number of high grade clay deposits on the holdings of the Pacific Improvement Company, some of which are operated by leasing companies, while the Ione company is only operating two clay pits, one near Ione adjoining the Newman clay banks, the other at mine No. 5. This latter shows a bed of clay 20 to 40 feet thick. The clay is soft, smooth and plastic, free from grit. The clay is hoisted in cars from pit over an incline, direct to storage shed. Six men are employed. A. J. Wood, superintendent.

Newman Clay Banks. Five clay banks have been opened up on the property of the Newman Clay Company, which is situated 1 mile north of Ione. No. 1 pit shows a bed of clay 8 feet thick, with an overburden of 2 to 8 feet thick. At No. 2 pit a bank of clay has been opened up 8 feet thick, overlain by 12 feet of clay, sand and gravel. On No. 3 pit only a small amount of work has been done. No. 4 pit is situated west of Amador Central Railway tracks. The clay is white, containing a large percentage of silica. It occurs in a



Newman clay pit No. 4, showing clay strata and overburden. Newman Clay Company, Ione, Amador County, California. Photo. by Walter W. Bradley.



Newman clay pit No. 5, showing clay strata and overburden. Newman Clay Company, Ione, Amador County, California.

massive bed, from 20 to 45 feet thick, overlain by 15 feet of overburden. In working this bank, the overburden is first stripped off. Then the bank is quarried, the clay being hoisted from pits in cars over an incline, to storage shed. No. 5 clay bank lies east of No. 4 bank, on the opposite side of the railroad tracks. At this bank a bed of clay has been developed 500 feet in length, which is 20 feet thick, overlain with 4 to 12 feet of overburden. Nos. 1, 2 and 5 are under lease to the Ione Fire Brick Company; Newman Clay Company, Ione, Cal., owners; Jacob Newman, manager; Frank B. Hand, superintendent.

Newman clay pit No. 5, showing storage shed. Newman Clay Company, Ione, Amador County, California.

Newman clay pit No. 4, showing clay strata and overburden. Newman Clay Company, Ione, Amador County, California.

Product Development Company Clay Banks. Situated $\frac{1}{2}$ mile west of Ione. The clay is white, containing a large percentage of silica. It occurs as a bed, from 18 to 20 feet thick, overlain by an overburden of gravel, sand and soil, from 2 to 6 feet thick. Worked from an open pit, and by a system of underground drifts. The clay from this pit is being treated by a washing process, to eliminate the silica. Material from the pit is raised in a bucket elevator to an agitating tank, where it is agitated with water. From this tank the pulp is allowed to flow over a dam to precipitate the silica, the material in solution flows to a collecting sump, where it is pumped back to washing plant, from which plant it flows in sluice boxes to six

Newman clay pit No. 4, showing storage sheds. Newman Clay Company, Ione, Amador County, California.

Clay pit No. 4, showing bank of fire clay with overburden. Newman Clay Company, Ione, Amador County, California.

10,000-gallon storage tanks, a distance of 375 feet. From storage tanks the material in solution is pumped by 4″ by 6″ Fairbanks-Morse force pump through two forty-leaf sugar-type presses. Leaves are 33″ by 33″, with No. 10 duck canvas, on which, after three-hour treatment, a cake of clay one inch thick is formed. This cake is dried in the drying yard during the summer months or on a hot pan drier during the winter. After the cake is thoroughly dry, it is passed through a disc pulverizer, ground to flour size and sacked for shipment. Silica product is sold to glass factories. Daily production of plant, 15 tons. Twelve men employed. Product Development Company, owner, No. 58 Sutter street, San Francisco. Leo Schlyter, superintendent.

Ione fire brick kilns. Ione Fire Brick Company, Ione, Amador County, California.

Drying yard of Ione Fire Brick Company and Newman clay pit No. 2, Ione, Amador County, California.

Steiger Terra Cotta and Pottery Works. At South San Francisco, office 45 Mills Building, San Francisco, obtain clay from four pits near Carbondale: Free, Irish Hill, Baker Hill, and Gage clay banks.

This company has a lease on a zone 3 miles square, from the Ione Coal and Iron Company. The Free and Irish Hill banks produce a plastic clay, while Baker Hill and Gage banks produce fire clay. Clay is hauled to storage sheds on the Southern Pacific Railroad, with a storage capacity of 13,000 tons. M. J. Bacon, of Carbondale, superintendent.

Ione Fire Brick Company, of 946 Monadnock Building, San Francisco. C. Hidecker, of San Francisco, manager; A. S. Cunningham, of Ione, superintendent. Clay quarried from Newman Clay Company banks, which the above company has under lease. The plant consists of five round down-draft brick kilns, oil fired; capacity of kilns being 65,000 bricks, or 13,000 bricks to the kiln. The yearly output of fire brick from this plant is about 3,000,000. Thirty-five men are employed.

COAL.

Lignite occurs in the Ione formation in Amador County, nearly all the valley between Ione and Carbondale being underlain by a lignite stratum, as has been determined by borings and shafts. Some shafts in the hills north of Lancha Plana have encountered coal, which appears to be an extension of the Ione bed. There are only two mines in operation in the Ione coal field: Harvey and mine No. 4 of the Ione Coal and Iron Company.

Buena Vista Mine. Situated in Sec. 18 and 19, T. 5 N., R. 9 E., on the Fitzsimmons ranch, 5 miles southeast of Ione. A bed of lignite coal 11 feet thick has been developed, which is overlain by 59 feet of clay. The coal beds have a strike of north and south, and dip 7° to 10° to southwest. Two shafts have been sunk to a depth of 70 feet, and 210 feet apart. A drift has been run south from the south shaft on the coal bed a distance of 400 feet, and north 100 feet. Drifted east and west 200 feet on coal stratum. Idle. C. R. Downs, of Sutter Creek, owner.

Harvey Mine. It is $\frac{1}{2}$ mile north of Carbondale. An extensive amount of systematic development has been done on this property, and a coal bed 20 feet thick, overlain by a body of clay and sand 20 feet thick, has been developed. Strike of coal bed is north and south, with a dip 8° W. Workings consist of a vertical shaft 88 feet deep, from which a crosscut has been driven 69 feet west in the coal seam, with drifts north and south totaling over 1000 feet. Four men employed. F. H. Harvey, of Galt, Cal., owner.

Ione Coal and Iron Company. See our Reports VII, pp. 41–42; VIII, p. 110; XI, p. 147.

The coal beds on this property have been developed through five shafts, only two of which are under operation at present, shafts No. 4 and No. 5. Both of these shafts are 90 feet deep; the present work is being carried on through No. 4 shaft, where a lignite stratum 7 to 15 feet thick has been developed, which is overlain by a body of clay and sand about 60 feet in thickness. The strike of these coal beds is north and south, with a dip of 5° to 7° SW. Average width of coal is 12 feet. There is a tramway 1000 feet long from No. 4 shaft to coal bunkers on the railroad. Twelve men are employed. Ione Coal and Iron Company, owner, 401–406 Crocker Building, San Francisco, Cal. A. J. Wood, superintendent.

COPPER.

General geology. The copper deposits occur in amphibolite schist, on both sides of a narrow strip of a little more than a mile in width, of Mariposa slates, traversing the county in a direction south by east to north by west from the Mokelumne to the Cosumnes River, extending north into El Dorado and south into Calaveras. On the eastern belt are located the Copper Hill, the Newton and a number of prospects. On the western belt are situated those of the Pacific Improvement Company, and various undeveloped properties. The character of the ores is essentially the same in all the deposits, chalcopyrite with pyrite forming the bulk, the richer oxides and sulphides being comparatively rare. The ores from the Newton mine on the eastern belt are distinguished by their purity, containing neither zinc nor any other injurious elements in appreciable quantities and very little gold and silver, while those of the western belt carry zinc, and greater values in gold and silver.

Allen (Hayward) Mine. It is situated north of the Newton mine, about 5 miles east of Ione. The ore occurs in lenses in amphibolite schists, which is capped with iron gossan. The ore is chalcopyrite associated with pyrite, with some zinc and marcasite. Developments consist of shaft 380 feet deep, with two levels at depths of 270 and 380 feet, with drifts north and south on the vein. Four men are employed on development work. G. E. Allen, of Sutter Creek, owner. C. M. Johnson, superintendent.

Cosumnes (Copper Hill) Mine. See our Bulletin No. 50, page 226. This property comprises 2,500 acres of patented land, owned by W. F. Detert, of Jackson, and that portion on which the old workings are located lies in Sec. 34 and 35, T. 8 N., R. 9 E. The main shaft is situated on the Cosumnes vein, running northwest and southeast, dipping 60° NE., varying in width from 2 to 4 feet. The ore is principally a fine-grained massive chalcopyrite, containing gold and silver values. The main shaft is 500 feet deep. A short distance from the main shaft is the southeast shaft, on a vein running parallel with the Cosumnes vein and about 50 feet east of it. It has a depth of 150 feet. Numerous prospect holes have been sunk on the main vein. There are over 1200 feet of shafts and over 1800 feet of drifts on this property. Idle.

The Johnson Ranch Mine. See our Bulletin 50, page 227. This property is located on Stony Creek, about 5 miles southwest of Jackson in Sec. 25, 35 and 36, T. 6 N., R. 10 E. The vein lies between the greenstone and slate, course northwest and southeast, dip to the northeast. Two shafts have been sunk on this vein to a depth of 90 and 210 feet. Idle. Frank Johnson, of Jackson, Cal., owner.

Ione Copper Mine. See our Bulletin 50, page 227. It is 3 miles northwest of Ione, near Irish Hill. Located in Sec. 11, T. 6 N., R. 9 E. The course of the vein is N. 35° W. dipping 60° NE., with an average width of 4 feet. Two shafts have been sunk on this vein; south shaft is 600 feet deep; and about 500 feet north is the other shaft, with a depth of 235 feet. Two ore shoots have been developed with lengths 35 and 110 feet. Some high-grade ore has been shipped from this property, assaying Cu 7%, Au $8.00, Ag 5 ounces, Zn 4.5%. There is a steam hoist and 3-stamp mill on the property. Three men are employed sorting over the dumps. Ione Coal and Iron Company, 401–406 Crocker Building, San Francisco, Cal., owner. D. F. McLennan, superintendent.

Newton Mine. See our Bulletin No. 50, pages 222–224. Situated 4 miles east of Ione, at Ranlett, on the stage road to Jackson and Sutter Creek. The gossan capped vein is from 4 to 8 feet wide, with a course of north and south, dip 70° E. The property was worked through two shafts, one 150 feet and the other 430 feet deep, and by 2000 feet of drifts on four levels, besides winzes and stopes. The ore is chalcopyrite associated with iron sulphides which occur in solid lenticular ore bodies. There is a steam hoist, and an 80-ton water-jacket blast furnace on the property. Last work on the property was in 1900. Idle. Mrs. E. A. Ranlett, Miss Helen Ranlett, New York City, owners.

Moon Mine. See our Bulletin No. 50, pages 224–225. It is 2½ miles east of Richey, and southerly from Newton mine. In Sec. 3, 9, 10, T. 5 N., R. 10 E. Two shafts, one 100 feet deep, the other 140 feet deep. Idle. J. B. Lucas, of Valley Springs, owner.

Thayer Mine. See our Bulletin No. 50, page 225. In Sec. 23, T. 5 N., R. 10 E., a little north of the Calaveras River. Situated 10 miles southeast of Ione. Shaft 250 feet deep. Idle. B. W. Thayer, of San Jose, Cal., owner.

For reference in regard to the following mines and prospects on the copper belt, which have been abandoned, see our

Bulletin No. 50, "The Copper Resources of California":

Bull Run Mine. Sec 15, T. 5 N., R. 10 E.

Chaparral Mine. Sec. 10, T. 5 N., R. 10 E.

Forest Home Mine. One half mile north of Forest Home.

Ione City Mine. Sec. 3 and 4, T. 5 N., R. 10 E.

Mineral City Mine. T. 8 N. R. 9 E.

Mutual Life Insurance Company. Twenty-seven hundred acres, 1 mile north of Forest Home.

Russell Mine. On Russell ranch, Sec. 10, T. 5 N., R. 10 E.

Whittle Mine. On Whittle ranch, 1 mile southeast of Forest Hill.

GOLD MINES.

Acme (Robinson) Mine (quartz). See our Report XIII, page 66. It is 3 miles north of Volcano, near the Oleta stage road. Shaft 300 feet deep. Caved. Idle. Acme Mining Company, owner.

A. and B. Mine (quartz). It is 1 mile south of Plymouth. Shaft 175 feet deep, sunk on vein at angle of 55°. Open cut 200 feet long by 50 feet wide. Vein distinguished by massive outcrop of quartz 50 to 100 feet in width, located on the hanging-wall of the Mother Lode. The vein has a slate footwall and a greenstone hanging-wall. Idle. Mrs. Maggie Reaves, 1316 Eighteenth street, Sacramento, Cal., owner. John C. Reaves, of Plymouth, agent.

Allison Mine (quartz). See our Report XIII, page 66. It is situated 1½ miles northwest of Plymouth. Course of vein is N. 45° W., dip 50° NE. and from 4 to 12 feet wide. Incline shaft 300 feet deep. Caved. Idle. State of California, owner.

Alma Mine (quartz). See our Reports XII, p. 70; XIII, p. 66. It is situated ¼ of a mile west of Jackson. Shaft 420 feet vertical; to a depth of 375 feet, then sunk an additional 600 feet on 60° incline. On 400-foot level a crosscut was driven 350 feet west in diabase, and there is a crosscut east 200 feet, cutting a belt of slate 140 feet wide to contact, between slate and diabase. A vein was cut in this slate belt, but contained no values. On the 1000-foot level, a crosscut was run east 20 feet to contact between slate and diabase, and drift driven 380 feet north and 463 feet south on gouge. At point 350 feet south of crosscut in south drift, a raise was put up 130 feet above the level. Shaft in good condition.

Equipment consists of 12″x14″ double drum steam hoist, 4-drill Rand compressor and two 80 h.p. boilers. Idle. Alma Mining Company, F. C. Siebe Estate, H. Paulson, secretary, 432 Battery street, San Francisco, Cal., owners. John B. Frances, of Jackson, agent.

Alpine (*Wheeler*) *Mine* (quartz). See our Report XIII, page 67. It is situated in the town of Plymouth, and north of the Plymouth Consolidated group of mines. Shaft sunk on an incline of 55° to depth of 200 feet, where a cross fissure was cut, from which point the shaft followed the cross fissure having a course of S. 26° E. to a depth of 460 feet on 55° incline. A lens of greenstone about 400 feet wide in the Mariposa slates forms the cross fissure. At a point 80 feet west of shaft, on 500-foot level, cross fissure vein intersects a north and south vein which cuts it off. Three veins have been developed: cross fissure, east and west, north and south. An extensive amount of drifting and crosscutting has been done on 500 and 600-foot levels, but no pay ore has been developed. Cross fissure and north and south veins have greenstone footwall and slate hanging-wall, while east and west veins have a greenstone hanging-wall and slate footwall. The equipment on the property consists of single drum hoist driven by 35 h.p. motor, and a (17″x14″)—(10″x14″) Ingersoll-Rand compressor driven by 100 h.p. motor. Idle. W. H. Hooper of Woodside, San Mateo County, Cal., owner.

Amador Gold (*Ætna*) *and Amador Queen Mines* (quartz). See our Reports VIII, p. 88; X, p. 102; XII, p. 71. Situated 2 miles south of Jackson. The deposit is a contact vein, having a Mariposa slate footwall and an amphibolite schist hanging-wall, which has a course of N. 10° W., with a dip of 65° E. On the surface it is distinguished by a massive outcrop of quartz about 50 feet in width. An incline shaft 700 feet deep was sunk on Amador Gold. Amador Queen shaft is 1250 feet deep, sunk on 65° incline. An extensive amount of drifting has been done on both properties, but ore developed was very low grade. Equipment consists of compressor and double drum electric hoist. Idle. W. J. McGee, of Jackson, Cal., owner.

Amador King (*Rhetta*) *Mine* (quartz). Situated 3 miles north of Plymouth, on Indian Creek. There are three parallel veins on property, which have a course of N. 10° W., with a dip of 60° to 80° E. The footwall vein has been developed by a crosscut tunnel of 400 feet, and a drift south on vein 200 feet. The vein has an average width of 4 feet, with a diabase footwall and Mariposa slate hanging. Idle. A Brown, H. A. Meyers, T. Levaggi, Plymouth, owners.

Ama Oro (*Whitmore*) *Mine* (quartz). Located ½ mile west of Volcano, on ridge north of Sutter Creek. Holdings consist of five claims: Yellow Kid, Whitmore, Stud Horse, Monday, Granite. There is a series of parallel veins on property, having a course of N. 40° E.

with a dip 55° SW. The developments consist of shaft 100 feet deep on Stud Horse vein, and a crosscut tunnel 202 feet long to west vein with a drift south on the vein 170 feet. On the Whitmore vein a tunnel has been driven 900 feet on vein, which gives 200 feet of backs. Equipment consists of compressor and 4-stamp mill. Idle. Ama Oro Mining Company, owner, 204 Westbank Building, San Francisco, Cal. A. C. Bothe, general manager; Emet Gillick, superintendent.

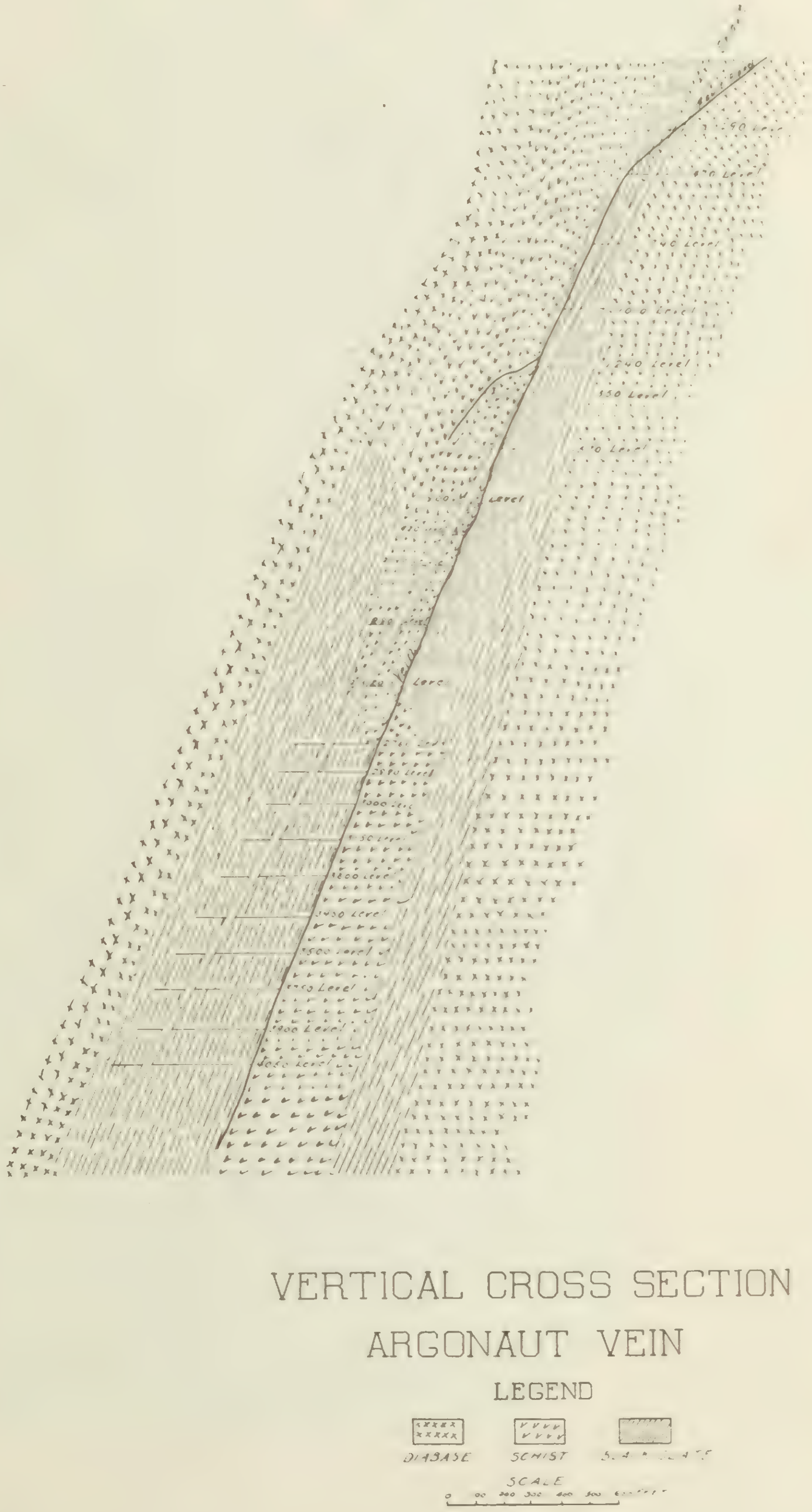
Amador Reduction Works (chlorination). See our Reports VIII, p. 96; XIII, p. 67. One half mile north of Sutter Creek. The chlorination plant, which is idle, consists of one reverberatory furnace, and a series of leaching and precipitation vats. The tailings from the chlorination plant are being treated in a 50-ton cyanide plant, which consists of steel cylindrical mill 48′ long x 3′ diameter; six wooden vats 21′ diameter x 6′ high, having a capacity of 50 tons each. Four storage tanks, twelve zinc boxes, 18″ diameter x 24″ high. Percolation method, used in treating tailings, on which an extraction of 50% is made. Five men are employed. Tailings under lease to Pioneer Reduction Company of Nevada City, Cal., B. Hall, manager. E. C. Voorhies, of Sutter Creek, Cal., owner.

Amador Queen No. 2 Mine (quartz). Located 2 miles south of Jackson. The vein is in the form of a stringer lead in the Mariposa slates. Workings include a crosscut tunnel 1300 feet long driven through slates to diabase footwall, where a shaft was sunk on the contact to a depth of 900 feet on 62° incline. On tunnel level drifts were driven 500 feet north and 700 feet south on the contact. There is a raise from tunnel level to surface on the contact of slates and diabase, a distance of 300 feet. From shaft, drifts were driven north and south on 500-foot and 700-foot levels. Old 20-stamp mill on property. Idle. Amador Improvement Company, Dr. Bardue, president, Mission and Twenty-second streets, San Francisco, Cal., owner.

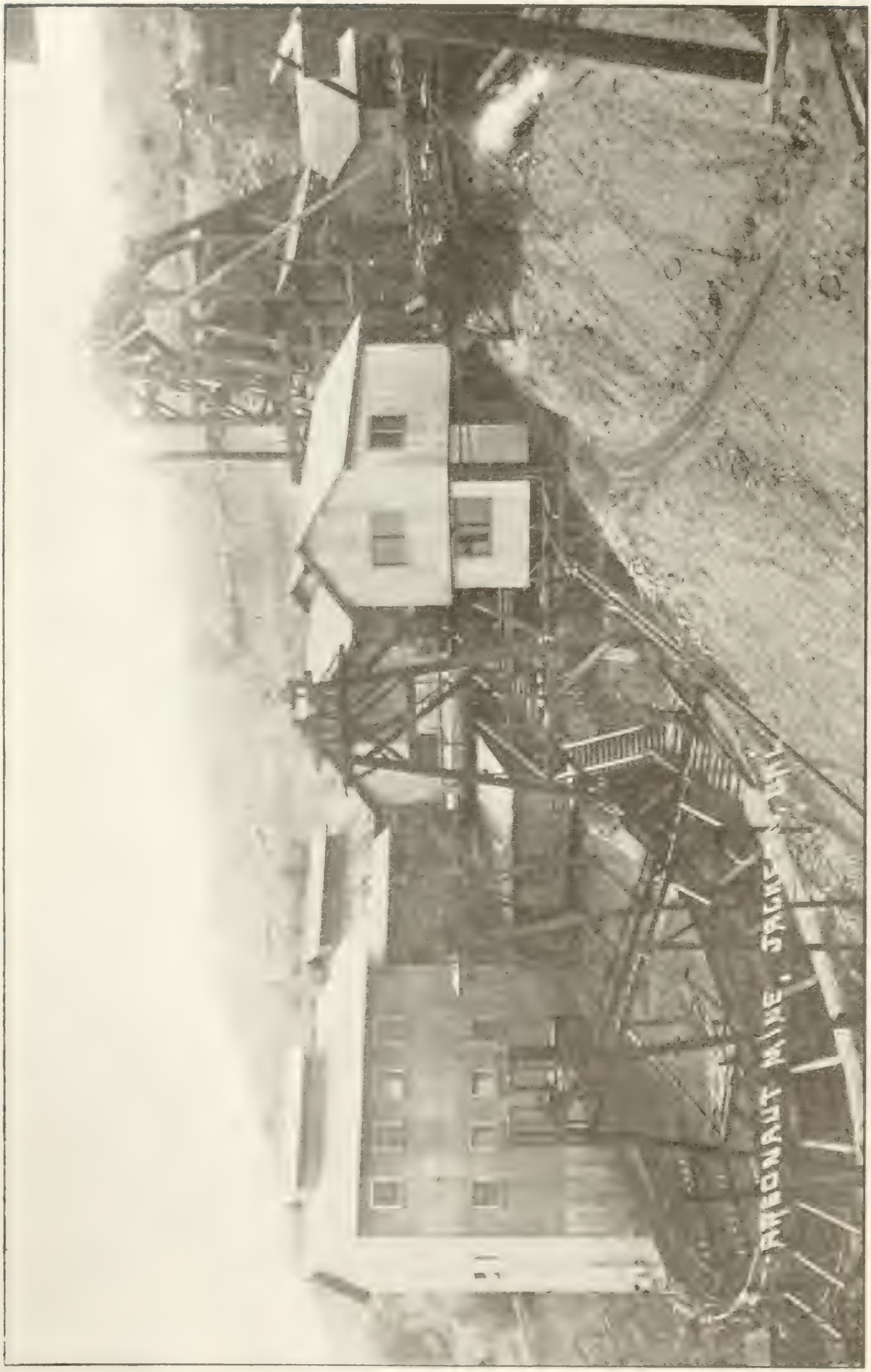
American Flat Mine (placer). It is ¾ of a mile southwest of Oleta, on American Flat channel. Course of channel is northeast and southwest. Workings consist of two incline shafts 300 feet deep, and a tunnel 900 feet in length. The width of channel from 100 to 200 feet wide, with a depth of gravel of 4 to 7 feet, lying on slate bedrock. Two men employed washing tailings from old workings. W. D. Upton, R. T. Upton, Oleta, Cal., owners.

Anita Mine (quartz). See our Report XIII, p. 68. It is ½ mile southwest of Jackson. Incline shaft sunk in black slate footwall to a depth of 750 feet on an angle of 63°. The vein has a course of N. 20° W., with a footwall of slate and greenstone hanging-wall. Idle. Anita Mining Company, 407 Montgomery street, San Francisco, Cal., owner.

Argonaut Mine (quartz). See our Reports VIII, p. 68; XII, p. 71; Bulletin 18, pp. 50–52. It is 1 mile northwest of Jackson, adjoining the Kennedy on the south. The workings consist of a three-compart-



VERTICAL CROSS SECTION
ARGONAUT VEIN



Headframe at the Argonaut Mine, Jackson, Amador County, California.

ment shaft 4250 feet deep, sunk on an angle of 60°. At the 290-foot level the shaft cuts the vein in diabase, where the vein has a dip of 40° NE. to the 470-foot level. From 470 to 4050-foot level it has a dip of 64°. On the 1240-foot level there is a split in the vein, with a branch running off into the schist hanging-wall. The shaft is in the slate hanging-wall from the 1460-foot level to its present depth of 4250 feet. The general strike of vein is N. 10° W. and is a very regular and continuous body of quartz from 8 to 12 feet in width. The vein outcrops in a metadiabase, while above the 290-foot level it passes into the Mariposa slates, and at the point where it passes into the slates it appears that the fissure was originally opened by a thrust fault with a throw of 120 feet, the hanging-wall being thrust upward over the footwall to at least that distance. The meta-andesite becomes an amphibolite schist on contact with the slates. Two ore shoots have been developed. The north shoot is 325 feet long with an average width of 10 feet, while the south shoot has a length of 600 feet, width of 10 feet. The present work is being done on 3600, 3750, 3900 and 4050-foot levels. The ore is hoisted in 4-ton skips by 500-h.p. double-drum electric hoist, and automatically dumped into storage bins in gallows frame. From bins the ore is fed to 10″ x 16″ Knight crusher, and trammed to mill in 2½-ton cars.

Mill: Forty stamps, weighing 1,000 pounds, dropping 98 drops per minute, with 7-inch drop, and crushing 5 tons per stamp through 20-mesh wire screen. From the amalgamating plates the pulp flows to 16 Frue vanners, while tailings from vanners flow to hydraulic classifiers, where the coarse sands are eliminated, overflow going to canvas plant. An extraction of 83 per cent is made by amalgamation and concentration. One hundred and forty-five men are employed at the property. Argonaut Mining Company, 404 Humboldt Bank Building, San Francisco, Cal., owner. N. S. Kelsey, superintendent.

Arroyo Seco (*Lambing*) *Mine* (placer). See our Report VI, Pt. II, p. 23; VIII, pp. 97–104. It is 3 miles north of Ione. Idle. Pacific Improvement Company, 401–406 Crocker Building, San Francisco, owner. D. F. McLennan, of Ione, agent.

Bay State Mine (quartz). See our Reports XI, p. 146; XII, p. 71. It is 4 miles north of Plymouth. Workings consist of double compartment shaft, 4½′x9′ in clear, sunk to a depth of 1000 feet on 60° incline. There are two parallel veins on property, which strike N. 15° W. On 300 and 700-foot levels crosscuts were driven west to footwall vein, with drifts north and south on vein. On 800 and 1000-foot levels crosscuts were driven east to east vein, and drifts run north and south. There is also crosscut to west vein on 1000-foot level and drifts north and south on vein. There is a double drum steam hoist and 10-stamp mill on the property. Idle. Stockton Savings Bank, Stockton, Cal., owner. Levaggi Estate Company, of Plymouth, agents.

Battle Mountain Mine (placer). It is 1 mile north of Volcano. Course of channel northeast and southwest, width of channel is 700 feet with a depth of gravel of 1 to 7 feet. Developments consist of tunnel 570 feet long. The bed rock is slate, and channel is capped with rhyolite-tuff 150 feet thick. Two men are employed. G. Logarmarsino et al., of Volcano, owners.

Belmont (Sutter Creek) Mine (quartz). See our Reports VIII, p. 73; XI, p. 143. It is 1½ miles north of town of Sutter Creek. Dismantled and idle.

Belmont Mine (quartz). It is located 5 miles southeast of Volcano. The vein has a north and south course and dips 80° W. In granodiorite formation. Shaft 145 feet deep on vein. Idle. Frank Shulberger, John McKelvey, Oakland Savings Bank Building, Oakland, Cal., owners.

Bunker Hill Mine (quartz). See our Reports VIII, p. 57; X, pp. 75–114; XII, p. 79; Bulletin 18, p. 80. It is 1½ miles north of Amador City. This property consists of three claims: Bunker Hill, Mayflower, and Nevada, 2,587 feet on the lode. From surface to 200-foot level the Bunker Hill vein occurs on contact between the metadiabase on the east and Mariposa slates on the west, the course of vein being N. 25° W., with a dip 58° E. It has an average width of 6 feet. The vein is in slate from the 200′ to 1400′ level, while from 1500′ to 2400′ level the vein has a greenstone footwall and slate hanging-wall. On the 1400′ level an orebody has been developed 40′ west of Bunker Hill vein, running parallel with the main fissure. The orebody is 860′ long with an average width of 30′, and at a point 860′ north of shaft makes into the main fissure. This orebody occurs in the form of lenses, the schist being cut by numerous stringers of quartz, the rock being highly impregnated with pyrite running as high as 4% to 5%. The gray orebody has been developed on the 1400′, 1500′, 1750′ 1950′ levels and has a general trend to the north. At points the orebody forms the footwall of the main Bunker Hill vein.

The main shaft is a two compartment shaft 5.3′x12.6′ in clear; 2587′ deep, sunk on an incline of 58°. From 1950′ to 2400′ level the shaft is sunk in the metadiabase. On 2400′ level, a crosscut has been driven 280′ to Bunker Hill vein with drift north 330′ and south 100′. Three shoots of ore have been developed on the property. The north and south shoots on Bunker Hill vein have an average length of 500′, with an average width of 6′. The shoot of gray orebody is 600′ long with an average width of 15′. The mine water is handled by a Dean Triplex pump (capacity 50 gallons per minute) driven by 20 h.p motor on 2100′ level, which lifts water to 800′ level to a Knight Triplex pump driven by 30 h.p. motor (capacity of pump 125 gallons per minute), which raises the water to 200′ level where it flows through a drain tunnel 3000′ long. Air for mining operations is furnished by (16″x14″) (10″x14″) Ingersoll-Rand compressor, driven by 100 h.p. motor. Ore is hoisted in 2½-ton skips by double-drum hoist driven by means of rope transmission from 300 h.p. motor, and automatically dumped into ore bins in the 75′ steel gallows-frame. From ore bins the ore is crushed by 10″x20″ Knight crusher, driven by 30 h.p. motor. Crushed ore goes to storage bin, from which it is trammed to mill in three-ton cars a distance of 550′.

Mill: forty stamps, 1150 pounds apiece, dropping 6½″, 96 drops per minute and crushing 5 tons per stamp through No. 4 punched screen; pulp from batteries flows over double compartment amalgamating plates to twenty-four 6-foot Frue vanners. Tailings from vanners go to Bunker Hill cyanide plant. Total number of men employed at property is 157. Bunker Hill Consolidated Mining Company, Humboldt Building, San Francisco, Cal., owner. Elisha Hampton, superintendent.

Steel headframe; also showing machine shops and hoist, at Bunker Hill Mine, Amador City, Amador County, California.

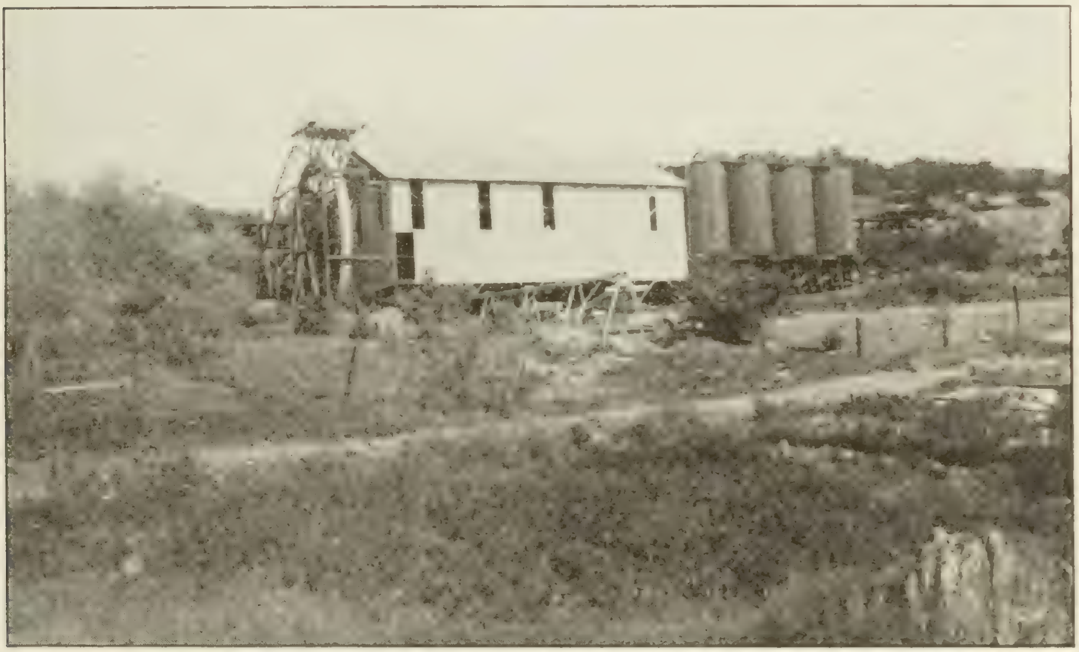
Bunker Hill Slime and Cyanide Plant. Tailings from Bunker Hill mill flow to slime plant by means of launders, from launder the pulp goes through a ¼-mesh revolving screen, then flows to five Callow cone classifiers (32-inch diameter by 3 feet high). Sands from five Callow cones go to one Callow cone (36″ diameter by 4½′ high). The sands from six Callow cones flow to another Callow cone classifier (36″ diameter by 4½′ high) sands from this classifier going to eight redwood tanks (12′ in diameter by 8′ high), overflow from six Callow cone classifiers to two Darrow rotary slime tables; concentrates saved on these tables flow to three Pachuca tanks. Waste pulp from tables goes to hydraulic classifier, where fine sands are eliminated; overflow from classifier flows to two Darrow rotary slime tables, overflow slimes from these tables go to waste, while concentrates flow to Pachuca tanks. Sands are treated in eight leaching vats, capacity of tanks being 100 tons. One hour before tank is full, 75 pounds of lime are added to the sands. Then sands are drained, from six to eight hours time of treatment, after which sands are given a preliminary wash with weak cyanide solution (about 8 tons of solution to a tank). This is followed by 0.1% solution, after which gold solution is pumped in. Finally washed with clear water, whole treatment being about eight days. The decanted solution from sand tanks flows to storage tanks, weak solution to 8′x12′ tank, and strong solution to 8′x12′ gold storage tank. Then to two 4′x8′ filter tanks and from filter tanks to zinc boxes. Concentrates are given the following treatment: The pulp is first agitated with lime in Pachuca tanks, 50 pounds of lime added to 11 tons of ore. Agitated for eight hours at a time with strong cyanide solution. Then allowed to settle and clear solution being decanted off, after which gold solution pumped in and agitated. Settled and clear solution decanted off. This treatment lasts from three to four days. The solution that is over 0.7 of a pound flows to storage tanks, from which it flows to zinc boxes, where gold is precipitated on zinc shavings. Tailings from mill run 99 cents per ton, on which a 45% extraction is made. The tailings are treated on a royalty basis. W. E. Darrow, V. R. Fitzsimmons et al., Sutter Creek, Cal., owners.

Forty-stamp mill at the Bunker Hill Mine, Amador City, Amador County, California.

Caledonia Mine (quartz). It is 7 miles northeast of Volcano. The vein has a course of N. 15° W. dip 60° E., average width 2 feet. Formation slate. Porphyry dike follows vein on hanging-wall. Developments consist of shaft 100 feet deep on vein, and a crosscut tunnel 150 feet in length. Two men employed driving crosscut tunnel. Parker Mining Company, Tracy, Cal., owner. L. Parker, manager.

California Slimes Concentrating and Cyanide Plant. A plant is under construction for treating the tailings from the Fremont mill by the California Slimes Concentrating Company, W. E. Darrow, president and manager; C. E. Richards, secretary, of Sutter Creek, Cal. Method of treatment is as follows:

Tailings from mill flow to 60-mesh revolving screen (diameter 10 feet, made in two sections 3 feet wide). The oversize from screen goes to tailings race, while through size is elevated by tailings elevator wheel (30 feet in diameter, size of buckets being 4″x6″, spaced 3 inches apart; wheel makes five revolutions per minute), 21 feet to two Darrow rotary slime tables. Concentrates from first two tables to storage sump, where pumped to four Pachuca tanks, size 10 feet in diameter by 18 feet high, having conical bottoms with 60° cone. The overflow from tables elevated to two conical classifiers, size 42-inch diameter by 9 feet high. Underflow from classifiers to waste sluice and overflow to two Darrow rotary slime tables. Concentrates go to sump joining concentrates from other tables and pumped to four Pachuca tanks, where air agitation and decantation method used in cyanide treatment. Tailings from mill run about 60 cents per ton. Three men are employed.



California Slimes Concentrating and Cyanide Plant. Treating the tailings from the Fremont mill. Drytown, Amador County, California.

Central Eureka (Summit) Mine (quartz). See our Reports X, p. 104; XI, p. 144; XII, p. 79; XIII, p. 69; Bulletin 18, p. 18. This property joins the South Eureka on the north, ½ mile south of the town of Sutter Creek. Workings are carried on through a three compartment shaft 15′x10′ in the clear 3170 feet deep, sunk on 57° incline. Three parallel veins have been developed. Shaft cuts contact or hanging-wall vein on the 500-foot level, and is sunk on vein to 2000-foot level. From 1800-foot to 3100-foot level new shaft was sunk in footwall. On 3000-foot level shaft cuts west vein, the east vein lying 20 feet east, while contact or hanging-wall vein lies 200 feet east of the first named. The veins are in the form of stringer leads with black slate gouge on footwall. Course of veins N. 20° W., dip 55° to 70° E., with an average width of six feet. Two series of ore shoots have been developed, north series being 60 feet in length, and south shoots 200 feet long. East and west veins have slate walls, while hanging-wall vein has a slate footwall and greenstone hanging-wall. In crosscutting the slates thin lenses of metadiabase are cut. Present work is being carried on the 2800′, 3000′, 3100′ levels, where some very good grade ore has been developed upon the east and west veins. Ore is hoisted in 2-ton skips by 16″x28″ double drum steam hoist. Power is furnished by two 60 h.p. boilers, oil being used as fuel. Air for mining operations is furnished by (19″x16″, 12″x16″) Ingersoll compressor, driven by 150 h.p. motor. Ore from bins fed by gravity to 10″x16″ Blake crusher, then trammed to mill.

View of Sutter Creek from the Central Eureka Mine.

Mill: 40 stamps, of 1150 pounds apiece, dropping 100 drops per minute, crushing 4¼ tons per stamp through 24-mesh screen, pulp from amalgamation plates goes to thirty-six 6-foot Frue vanners. Mill driven by 75 h.p. motor. Only 20 stamps under operation. Central Eureka Mining Company, owner, 254 Russ Building, San Francisco; J. Davis, general manager.

The Central Eureka Mine, Sutter Creek, Amador County, California.

Clark Gravel Mine (placer). It is 2 miles south of Oleta. Course of channel is northeast and southwest. Capped with andesite flow 100 feet thick. Width of channel is from 60 to 300 feet. Depth of gravel from 4 to 7 feet and slightly cemented. Developments consist of two bedrock tunnels 800 feet in length. Two men are employed. W. D. Clark, F. M. Clark et al., Oleta, owners.

Cleveland Consolidated Placer Mine (placer). It is situated ¼ of mile northwest of Volcano. Course of channel is northwest and southeast. Capped with andesite flow 150 feet thick. Width of channel 60 to 150 feet, with a depth of gravel of 18 inches to 3 feet. The bedrock is slate. Developments consist of tunnel driven 417 feet west in slate bedrock and then northwest on channel 1100 feet. The gravel is cemented, containing large boulders of quartz and quartzite. The gravel is first allowed to slack and then treated in a Dodge disintegrating mill. Four men are employed. W. I. Smart, Victor Mathat et al., of Volcano, owners. Victor Mathat, superintendent.

Clinton Bar Mine (placer). It is 4½ miles southeast of Pine Grove in canyon of Mokelumne River. Working river bar, and drifting on old river channel. Two men employed. A. C. Adams, of Pine Grove, owner.

Clinton Consolidated (*Union Consolidated*) *Mine* (quartz). See our Reports XI, p. 142; XII, p. 72.

There are two veins on the property cutting the black slates in northeast and southwest direction and dipping 56° W. Shaft 680 feet deep sunk on Union vein, and tunnel 1000 feet long on Paugh or gouge vein cutting the shaft at the 280-foot level where the gouge and Union veins intersect. Steam hoist and 30-stamp mill on property. Idle. Chas. Wieland, of San Francisco, owner.

Columbus Gravel Mine (placer). It is 4½ miles northwest of Volcano. The channel has a northerly and southerly course and is capped by an andesite flow 100 feet thick. Width of channel is from 150 to 500 feet, depth of gravel being 2 to 8 feet. Gravel is partially cemented. Bedrock is a mica schist. Developments consist of two tunnels; north tunnel 400 feet long and south tunnel 260 feet in length. Two men are employed driving south tunnel to cut channel; this tunnel is 30 feet lower than north tunnel. G. B. Cassanelli et al., of Volcano, Cal., owner.

Comet Mine (quartz). It is 1 mile south of Amador City. Shaft 200 feet deep. Caved. Mary Mahoney Estate, of Sutter Creek, owner.

Contention (*Belding*) *Mine* (quartz). It is 2½ miles northwest of West Point, Calaveras County. Idle. Thomas Severus, of West Point, owner.

Creek Ledge Mine (quartz). It is 1 mile north of Plymouth, on Indian Creek. Shaft 100 feet deep, sunk on vein at an angle of 60°. Idle. Webb Smith et al., of Jackson, owners.

Crown Point Mine (quartz). See our Report XII, p. 92. It is 2 miles northwest of West Point, Calaveras County. Controls Tierakoff mine. Crown Point Mining Company, owner, Oakland, Cal.

Dane & Mitchell Mine (quartz). It is 1½ miles south of Volcano. Strike of vein is N. 60° E., dip 45° E. The formation is a mica schist. Shaft 200 feet deep sunk on vein. Steam hoist (18″ x 11″ x 14″), Sullivan compressor, and 10-stamp mill on property. Idle. Dane-Mitchell Mining Company, owner, San Francisco. W. D. O'Donnell, manager.

Defender Mine (quartz). It is situated 5 miles southeast of Volcano. Shaft 360 feet deep, sunk on vein having a course of N. 15° W., dip 85° W. In granodiorite, average width of vein is 20 inches. A series of east and west diorite dikes cut the vein, having a width of 4 inches to 2 feet. At 130 feet south of shaft on 200-foot level the vein is cut by a diorite dike 22 feet wide, which has a strike of N. 50° E. with a dip 76° SE. Further development showed no ore south of this dike.

The ore is base in character, containing free gold, pyrite, chalcopyrite, marcasite, galena, sphalerite, pyrrhotite. There is a steam hoist, compressor, 10 stamp mill and 10-foot Lane mill on the property. Eight men are employed. George Joyce, F. B. Joyce, et al., owners, Defender. F. B. Joyce, superintendent.

Downs Mine (quartz). See our Report VI, Pt. II, p. 20. It is 2 miles east of Volcano. Idle and dismantled. R. C. Downs, of Sutter Creek, owner.

Doyle Mine (quartz). See our Report X, p. 107. It is 2 miles south of Jackson. Shaft 150 feet deep. Idle. William Doyle, of Jackson, owner.

Dry Creek Mine (placer). It is 5 miles north of Volcano; is worked by ground sluicing. Reale, Bell, and Hadley, of Jackson, owners. George Hadley, superintendent.

Eldorado Mine (quartz). At Amador City, on Amador Creek. Shaft on vein 300 feet deep, sunk on 45° incline. Idle. T. C. Mayou, owner, 1269 Market street, San Francisco, Cal.

Elephant and China Hill Hydraulic Mines (hydraulic). Controls the following claims: Elephant, China Hill, South Branch, Mallers, Hull and Ross, and Hodgdon Grant. Total of 645 acres. Water rights of Amador County to Tiger, Panther, Mill, and Antelope creeks; also owns Amador County Canal and McLaughlin ditches.

An extensive amount of hydraulic mining has been done on these placer holdings in past. In late years no mining operations have been carried on. Consolidated Amador and Volcano Hydraulic Gold Mining and Land Company of California, McLaughlin Estate, 354 Pine street, San Francisco, owners. Harry Lamberton, manager.

Enoch Mine (quartz). It is 2½ miles west of Volcano. Strike of vein is northeast and southwest, dipping 60° SE. Vein has an average width of 2 feet. Formation slate. Tunnel 700 feet in length driven on vein. Two men employed. E. A. Trask, of Pine Grove, owner.

Excelsior (*Idaho Jr.*) *Mine* (quartz). It is 1 mile east of Amador City. Vein has an average width of 2 feet, with slate footwall and greenstone hanging-wall. Strike N. 3° W., dip 65° E. Shaft 50 feet deep sunk on vein. Idle. Excelsior Mining Company, owner. J. R. Tregloan, agent, 1136 Merchants Exchange Building, San Francisco.

Eureka (*Hayward*) *Mine* (quartz). See our Report X, pp. 72, 102. It is situated in the southern suburbs of the town of Sutter Creek. Idle for years. Mrs. Hetty Green, of New York, owner.

Farrall Mine (quartz). It is on the Mokelumne River 4 miles south of Jackson. Idle. Lester Jacobs, of San Francisco, owner.

Fifty-four Flat Mine (placer). It is 5 miles northwest of Volcano. Idle. Fifty-four Flat Mining Company, owner. Dr. Nichols, of Sutter Creek, president.

Focus Mine (quartz). It is on Sutter Creek, 2 miles west of Volcano. Shaft 340 feet deep, sunk on vein at an angle of 60°. Ten-stamp mill on property. Idle. Knight and Company, Sutter Creek, owner.

Forty-nine Flat Mine (placer). It is 4 miles north of Volcano. Workings consist of two tunnels 1200 and 800 feet in length, with numerous lateral drifts. Channel capped with volcanic tuff 100 feet thick. Width of gravel is 100 feet with a depth of 2 to 6 feet. Bed rock is a soft mica schist. Four men employed. A. L. Reale et al., owners, 614 Sixteenth street, Sacramento.

Fremont (*Gover*) *Mine* (quartz). See our Reports VIII, p. 53; X, p. 75; XI, p. 146; XII, p. 72. Bulletin 18, pp. 80, 81. This property, 1½ miles north of Amador City, comprises Fremont, Gover, North Gover, Loyal Lode, 4200 feet on the lode. The property has been developed through two shafts, Fremont shaft being 2300 feet deep sunk on an incline of 51°, and north of Fremont shaft on the Gover claim there is an incline 1500 feet deep. The vein occurs on the contact of black slates on the west, and metadiabase on the east. The vein has a strike of N. 25° W., with a dip of 50° E., with average width of 6 feet. West of the main vein a schist ore body has been developed, which occurs in the form of lenses of various sizes. This schist ore body is in the form of quartz stringers cutting the schist, the rock being highly mineralized with pyrite. The workings on this property are very extensive, aggregating in all several miles. Steam hoist at both shafts, with oil used as fuel. Forty-stamp mill on property. One hundred forty men are employed. Fremont Consolidated Mining Company, owner, 24 Market street, San Francisco. Arthur Goodall, general manager. A. L. Palmer, superintendent.

Hoist and headframe at the Fremont Mine, Drytown, Amador County, California.

Good Hope Mine (quartz). See our Report XIII, p. 71. It is at Jackson. Shaft 125 feet deep. Idle. C. P. Vicini et al., owners, Jackson.

Grand Prize Mine (quartz). It is 4 miles southeast of Volcano. In granodiorite formation. Shaft 125 feet deep. Tunnel 200 feet in length on the vein. Idle. George Andrews, owner, New York City.

Gritton Mine (placer). It is ½ mile north of Volcano, on Clapboard Gulch. Tunnel 800 feet in length. Shaft 100 feet deep. Idle. G. A. Gritton, owner, Jackson.

Hardenburg Mine (quartz). See our Reports X, pp. 68, 106; XI, p. 139; XII, p. 74. This property, 3½ miles south of Jackson, comprises the Hardenburg, Littlefield claims, 2300 feet on the lode. The vein occurs on the contact between black slate on footwall and amphibolite schist on hanging-wall. The vein has an average width of 6 feet with wide black slate gouge on footwall, and heavy rotten hanging-wall, which make it very difficult to mine the ore. The course of vein is N. 15° W., dipping 45° E. A three-compartment vertical shaft each compartment being 4′ x 5′ in clear, has been sunk to a depth of 1070 feet. Shaft timbered with 14″ x 14″ red fir. The shaft will intersect the vein at a depth of 1500 feet. The workings consist of two levels, 850 feet and 1000 feet. On 850-foot level a crosscut has been driven west 365 feet to vein, with drifts south 308 feet and north 20 feet. At 1000-foot level the vein was cut by a crosscut 245 feet west of shaft with drifts on vein 428 feet south and 85 feet north. An ore shoot has been developed 430 feet in length with average width of 6 feet. On 850-foot level a crosscut has been driven west 250 feet to cut Littlefield vein. Ore hoisted in 1½-ton skips by double drum electric hoist driven by 450 h.p. motor. Air for drills is furnished by (16″ x 14″) (10″ x 14″) Ingersoll-Rand compressor driven by 100 h.p. motor. Ore is crushed by 10″ x 16″ Knight crusher driven by 25 h.p. motor. From ore bins at headframe the ore is trammed to the mill a distance of 300 feet.

Mill: Twenty stamps, weighing 1150 pounds each, eight 6-foot Frue vanners. The mill is driven by 75 h.p. motor. Five men employed on development work. Hardenburg Mining Company, San Francisco National Bank Building, owner. Henry Malloch, general manager. W. H. Schmal, superintendent.

Irma Mine (quartz). It is at Pioneer, 5 miles east of Volcano. The vein occurs in granodiorite, the quartz containing 10 per cent sulphurets, chiefly pyrrhotite. The shaft is 193 feet deep. Idle and dismantled. L. Cassinelli, owner, Volcano.

Isaac Newton Mine (quartz). It is 4 miles south of Jackson, on the ''black metal'' belt. Tunnel 300 feet long. Idle. Gustave Bowman, of New York City, owner.

Ivanhoe Mine (quartz). It is 2½ miles northeast of Plymouth. Two shafts, 100 feet and 200 feet deep. Idle. S. C. Wheeler, of Plymouth, owner.

Jose Gulch Mine (quartz). At Butte City, on Jackson and Mokelumne Hill road. Comprising the Brown, Crown, Aurora claims, 3000 feet on the lode. Workings consist of a shaft 200 feet deep, several tunnels and open cuts. There is a 10-stamp mill on property. Idle. Jose Gulch Mining Company, owner.

Kate Gray Mine (quartz). A prospect 2½ miles east of Volcano. W. Q. Mason of Pioneer, owner.

Katherine Mine (quartz). It is 5 miles east of Volcano. Comprising the Katherine and Adeline claims. Two tunnels 100 feet and 250 feet in length. Idle. Douglas Keith of Berkeley, owner.

Kelly Mine (quartz). It is at Pioneer, 5 miles east of Volcano. Shaft 90 feet deep. Idle. Frank Kelly, of Volcano, owner.

Kelly Mine (quartz). See our Report X, p. 108. It is 4 miles south of Jackson, comprising Kelly Gold, and McKay and Love claims. Tunnel 800 feet in length on vein. Caved. Idle. C. P. Vicini, owner, Jackson.

Kennedy Mine (quartz). See our Reports VIII, pp. 66–70; X, p. 103; XI, p. 141; XII, p. 74. Bulletin 18, pages 52–60. It is 1 mile north of Jackson, joining the Argonaut mine on the north. Controls the following claims: Kennedy, Kennedy Mill Site, Silva, Hall placer mine, Bellwether, Clyde, North Clyde, North Clyde placer mine, 3100 feet on the lode.

The Kennedy vein outcrops in a meta-andesite but soon passes into a narrow belt of Mariposa slates, within which the vein takes a dip of 57° to the east. It is usually strong and well defined, but it is sometimes in the form of a stringer lead. The vein follows the main eastern contact of the clay-slates with the meta-andesite, but does not conform to it at all points. The pay shoots have a trend to the north. The pay as a rule occurs near the footwall, and the vein has a heavy black gouge on the footwall from 1 to 2 feet thick, which contains some values. Three veins have been developed on the property: east, west, and footwall veins. Between the 1700-foot and 2200-foot levels there is a split in main vein, which forms the east and west veins. These veins come together on the 2800-foot level, 800 feet north of the crosscut from the main shaft. Ore shoots form north of crosscut from shaft on the west vein and south of the crosscut on east vein. The method of developing these two veins is as follows: A system of crosscuts is run from drifts north on west vein to cut east vein, while from drifts south on east vein, crosscuts are run at intervals to develop west vein. There are three shafts on the property: South shaft 2300 feet deep on the incline, being vertical for 376 feet, from which point it is on 60° incline. North shaft sunk on an incline to a depth of 2500 feet. The east shaft, the main working shaft, of 3 compartments, 6′ x 20′ in clear, has been sunk to a vertical depth of 3900 feet, in the diabase 1950 feet east of vein. This shaft cuts east vein at a depth of 3680 feet, and will cut footwall vein at a depth of 4000 feet.

Present stoping operations are being carried on from 2700-foot to 3600-foot level. On 3300-foot level they have crosscut 210 feet west to east vein, and 380 feet to west vein, with drifts 840 feet south on east vein and 75 feet north. On the west vein a drift has been driven 600 feet north, developing an average of 6 feet of quartz with 2 feet of gouge on the footwall. On this level west vein has diabase footwall with slate hanging-wall. At 3450-foot level there is a drift north from crosscut on west vein 600 feet, with drift south on east vein a distance of 600 feet. On 3600-foot level, drift north from crosscut on west vein 600 feet, and south 500 feet on east vein; developing a vein having an average width of 12 feet. At 3600-foot level the east vein has greenstone footwall and slate hanging-wall. A large amount of timbering is used in this mine due mainly to the heavy swelling ground, necessitating

Headframe and mill at the Kennedy Mine, Jackson, Amador County, California.

the use of large timbers and filling with waste within one set of the roof. Most of the filling is derived from crosscuts driven for prospecting the east and west veins. Mining operations are carried on with air drills Air is furnished by two compressors (15″ x 30″) (25″ x 30″) Murry compound Corliss compressor, capacity of 1200 cubic feet of air, and an 800-cubic foot Fulton Engineering Company compressor. Nine 80 h.p. boilers, oil fired, furnish steam for hoist and compressors. Ore is hoisted in 4-ton skips by 800 h.p. double drum hoist, capacity of 4000 feet; dumped over grizzly, the fines going to storage bins, capacity 200 tons, and the coarse material to 12″ x 16″ Blake crusher. From storage bins in head frame the ore is trammed in two-ton cars to mill bins which have a capacity of 2000 tons.

Tailings elevators at the Kennedy Mine, Jackson, Amador County, California.

Mill: This mill contains 100 stamps, weight 1250 pounds each. The monthly capacity is about 15,000 tons. The stamps drop 7½ inches, 96 times per minute. The height of discharge is from 8 to 10 inches, three different chuck-blocks being employed to keep this as nearly uniform as possible. The grade of the plates is 1½″ per 12″, 24-mesh brass wire screen is used in the battery. There are forty 6-foot Frue vanners in use. The mill is driven by two General Electric motors, 150 h.p. and 100 h.p., by means of a rope drive. Concentrates from Frue vanners are reconcentrated on two 6-foot Gates concentrators. Tailings from mill to hydraulic classifiers or spitz-kasten, where the coarse sands are eliminated. The overflow to slimes plant where the slimes are distributed to sixty canvas tables, size 10′ x 12′. The washings from the canvas tables to two bumping circular tables and one Gates concentrator. The overflow from these goes to eight additional canvas tables. Waste overflow joins sands from classifiers and flows by means of a launder 990 feet long, with grade 2½ feet per 100′ to first tailings elevator. The diameter of tailings wheel is 68 feet, with 176 buckets per elevator (buckets, 18″ x 8″) having lift of 48 feet to each elevator. These elevators handle 500 tons of pulp with a consistency of 7 to 1. Sixty inches of water are used in excess of the slimes. The slimes from launder flow to first elevator, which elevates pulp to second launder that carries pulp a distance of 75 feet to second elevator wheel, where the pulp is elevated to a launder 800 feet long, thence to third elevator wheel which raises it to launder 160 feet long that conveys the tailings to fourth elevator, where the pulp is raised to a flume 1000 feet in length, and flows to storage reservoir. Here the tailings are impounded by a concrete dam 540 feet in length and 50 feet high. Each tailings wheel is driven by a 15 h.p. General Electric motor.

An extraction of 83% is made by the mill. Tailings run about 60¢ to 80¢ per ton. Concentrates saved by the vanners have an assay value of $100 per ton, while slimes from canvas plant run about $50 per ton. The concentrates are treated at the mine by 10-ton chlorination plant, which consists of two roasting furnaces 85′ x 12′. Two hundred men are employed. Kennedy Mining and Milling Company, owner, 409 Montgomery street, San Francisco. Webb Smith, superintendent.

Kennedy Extension Mine (quartz). It is 1 mile northwest of Jackson, joining the Kennedy mine on the south. Comprising the Jackson, Muldoon, Muldoon Mill site, and Jackson placer mine, with 1419 feet on the lode. Strike of vein is N. 20° W., dipping 66° E. The footwall is a Mariposa slate, and the hanging-wall is diabase. A 2-compartment shaft (4′ x 5′ in clear) has been sunk to a depth of 1000′ on 66° incline. Four men are employed in development work. Kennedy Extension Gold Mining Company, owner. A. C. Perry, superintendent.

Keystone Mine (quartz). See our Reports VI, Pt. II, p. 16; VIII, p. 63; XI, p. 145; XII, p. 77. It is situated at Amador City. Comprises the Niagara, East Keystone, Spring Hill and Geneva, Keystone.

Keystone Tract, and South Keystone, 4400 feet on the lode. The Keystone vein occurs on the contact between the black clay slates and meta-andesite, the former being the footwall and the latter the hanging-wall. It is a massive vein of white quartz from 12′ to 200′ wide. Two other veins have been developed, as the Spring Hill and east veins.

The Keystone Mine and Mill, Amador City, Amador County, California.

Above the 900-foot level the ore was mined from the contact vein; also a series of parallel stringer leads in the footwall slates was mined, producing from the 900-foot level to the surface about $17,000,000. These stringer leads dipped eastward into the main contact vein at angles of about 47°. The ore body was of a lenticular form, the middle portion of which lenses being occupied by a large and solid quartz vein. On the 900-foot level this ore body was 600 feet long pinching out 200 feet north of shaft and 400 feet south of shaft. There are two shafts on the property: Patton shaft is 2680′ deep, sunk on an angle of 52°, three compartments, 6′ x 20′ in clear, and south shaft 1118′ deep on 60° incline. The former is the main working shaft. From the 1400-foot level, shaft was sunk to 2600-foot level in hard diabase. On this level a crosscut was driven through diabase 690′ west of contact vein, with a drift north on vein 350′ and south 450′, on which no ore was developed. Then the crosscut was continued west 500′ cutting a body of slate 380′ wide. At a point 400′ south in south drift a crosscut was driven in the slate 275′, but no ore was found. The ore at present being mined is from east vein in greenstone to the east of contact vein on 900-foot and 1200-foot levels, where an ore body has been developed 120′ long and 25′ in width, assaying $7.00 per ton. This vein in places is 85′ wide, and to the north flattens from 45° to 15°. On the 900-foot level there is a crosscut 150′ east to Spring Hill vein, with drift north on vein 800′ and south 300′. At 1200-foot level is a crosscut east 320′ to east vein and drift north in footwall of east vein, a distance of 430′, where it cut the vein at the old workings. Then a drift was driven 640′ north. Ore is hoisted in 2-ton skips by double drum electric hoist driven by 300 h.p. motor, 12-rope transmission drive. Air for drills furnished by (17″ x 14″) (10″ x 14″) Ingersoll-Rand compressor. The ore from mine is crushed by a 5-K Gates gyratory crusher driven by 30 h.p. motor.

Mill: Twenty stamps weighing 1050 pounds each, using 7-inch drop, 102 drops per minute, crushing 5 tons through No. 3 punched screens. Pulp from plates concentrated by twelve 6-foot Frue vanners. Mill is driven by 150 h.p. motor. An extraction of 90% is made in straight amalgamation and concentration. Tailings running 30¢ per ton. Concentrates have a value of $50 per ton. Thirty-three men are employed. Keystone Mining Company, owner, Jackson, Cal. C. R. Downs, of Sutter Creek, Cal., superintendent.

Kimball Group of Mines (quartz). Situated 5 miles east of Volcano, in the Pioneer District. Comprising Lucky Strike, De Soto, Gold Crown, Deadwood, Dead Sheep. There is a series of parallel veins in granodiorite, having average width of 18″. Strike northwest and southeast, dip 70° W. Lucky Strike shaft 115′, De Soto shaft 70′. De Soto tunnel 400′ long. Dead Sheep shaft 200′ deep. The ore contains high percentage of sulphides in the form of pyrite, galena, marcasite, pyrrhotite. Two men employed sinking Lucky Strike shaft. A. A. Kimball, Pioneer, owner.

Levaggi Mine (quartz). It is 8 miles southeast of Volcano, on the North Fork of the Mokelumne River. Claims: Sawyer, Sawyer placer mine, Eureka, and Sunny South. Vein strikes north and south dip 45° west, having average width of 3 feet. In granodiorite formation. Tunnel is driven on vein for a distance of 1450 feet; at point 450 feet from mouth of tunnel there is winze 100 feet deep sunk on a pay shoot 100 feet in length, and having an average width of 3 feet. There is a 10-stamp mill on property. Idle. Levaggi Estate Company, owner. J. Esola, of West Point, agent.

Lincoln Consolidated Mines (quartz). See our Reports VIII, p. 73; X, pp. 72, 100; XII, p. 78. Bulletin 18, pp. 72-74. For Wildman mine, see our Reports VIII, p. 75; X, p. 101; XI, p. 144; XII, p. 80; Bulletin 18, pp. 65–71. For Mahoney and South Mahoney mines, see our Reports VIII, p. 73; X, p. 72; XII, p. 78; Bulletin 18, pp. 65–71.

These properties are situated at Sutter Creek. Comprising Lincoln, Stewart, Belmont, Wildman, Mahoney, South Mahoney, Lincoln Mill Site, and Walchter ranch. Controlling 383 acres, with 4200 feet on the lode. There are four shafts on this property: Wildman, 1400 feet deep on an incline of 72°. Emerson shaft 619 feet vertical. Mahoney shaft is an incline shaft 1200 feet deep, sunk on an angle of 62°. Lincoln shaft has a depth of 2000 feet, on an incline of 63°. The Emerson shaft was sunk in diabase 1000 feet east of Wildman shaft to cut Wildman vein at a vertical depth of 2300 feet. The ore body on the Wildman claim occurs in the black Mariposa clay slates, associated with some amphibolite schist. This ore body is divided into three distinct leads, called granite boulder, main lead, and Magpie lead, the main lead being a well defined vein of solid quartz, which passes into a stringer lead. The granite boulder lead lies on the footwall or western side of main lead, between the latter and the footwall slates. It is a body of amphibolite schist which is traversed in all directions by quartz stringers impregnated with pyrite. The Magpie is a stringer lead similar in character lying on the hanging-wall side of the main vein, the impregnated country rock being a black slate. The ore in both these leads is low grade. The ore body in the Mahoney mine is a stringer lead in black clay slates with a footwall of amphibolite schist. One hundred feet north of the Mahoney shaft the lode appears to divide, the Lincoln mine being on the western branch; east branch going into the Stewart claim.

The ore body in the Lincoln mine is reported to have been cut out by a large horse of greenstone on the 400-foot level; below this level no ore was developed, although an extensive amount of drifting and crosscutting was done. The vein on the Wildman on 1400-foot level is 160 feet of solid quartz. There are two mills on this property of 40 stamps each. Idle. Lincoln Consolidated Mining Company, owner. Jackson. William J. McGee, agent.

Little Illinois Mine (quartz). Situated 1 mile northeast of Drytown. Incline shaft 147 feet deep. There is a Teddy Jaw Pulvo crusher and a 6-foot Huntington mill on the property. Eight men employed cleaning out and retimbering shaft. Little Illinois Mining Company, owner, Drytown. J. W. Buchanan, manager.

Lone Willow Group of Mines (quartz). Situated 7 miles east of Volcano, comprising the following claims: Lone Willow, Sunny South, California, Mungo Park. Lone Willow tunnel 200 feet long, Sunny South shaft 100 feet deep. Idle. Chas. Gracey of Pioneer, owner.

Lucille (*New London*) *Mine* (quartz). See our Reports VIII, p. 49; X, p. 117; XII, p. 78. At Plymouth; see Plymouth Consolidated Gold Mines.

Madroña (*Harding*) *Mine* (quartz). It is about 7 miles southeast from Volcano, and ½ mile south from Pioneer. Comprising the following claims: Madroña, Pioneer, Pioneer Extension, Rattlesnake, McQuaid, North Jewell, Bowman, Golden Gate. There is shaft on

Madroña claim 100 feet in depth. On the Pioneer claim shaft 360 feet deep. The formation is granodiorite. L. Cassinelli, of Volcano, owner.

Mahoney Mine (see Lincoln).

Mammoth Mine (quartz). See our Reports VI (Part II), p. 21; VIII, p. 93; XI, p. 67, 108; XII, p. 78. Idle. F. W. Patterson Estate, of Fresno, Cal., owner. Alexander Chalmers of Angels, agent.

Markley Mine (quartz). See U. S. Mineral Resources, West of Rocky Mountains: 1870, p. 37; 1871, p. 89; 1872, p. 44. East and west vein cutting slate formation with dip of 60° N. Property under lease to William Dicting of Volcano, California, who is sinking a new shaft. There is a 10-stamp mill on the property. Four men are employed. George Howard et al., owners, Sacramento.

McIntyre Mine (quartz). See our Report X, p. 115. It is ½ mile southwest of Amador City. Incline shaft 200 feet deep. Idle. John McIntyre et al., of Sacramento, owner.

Mechanics Mine (quartz). It is ½ mile east of Sutter Creek. Idle. P. Fagan, of Sutter Creek, owner.

Middle Bar Group of Mines (quartz). They are 4 miles south of Jackson, near Middle Bar crossing of Mokelumne River. Comprises the Wetzler, Middle Bar, Astoria, and Elephantine. Series of tunnels on the property. Idle. G. W. Brown, M. Thomas et al., owners, Jackson.

Midway Mine (quartz). It is 7 miles east of Volcano. Comprising two claims: Midway, Esmeralda. Developments consist of two tunnels on vein, 200 and 400 feet in length. Granodiorite formation. Idle. W. Q. Mason, of Pioneer, owner.

Modoc Mine (quartz). It is ¾ of a mile east of Pioneer. Idle. F. Mace, of Volcano, owner.

Monte de Oro Mine (quartz). It is 2 miles north of Plymouth. Massive outcrop of quartz formed by intersection of north and south and N. 30° E. veins. On south end of claim ore was mined from an open cut 500 feet in length. At the north end of claim vein was prospected by crosscut tunnel 785 feet long, which gives 200 feet of backs. There is a 10-stamp mill on property. Idle. Levaggi Estate Company, owner, Plymouth.

Moore Mine (quartz). See our Reports VI (Part II), p. 20; VIII, p. 84; XII, p. 78. It is a mile south of Jackson. Workings caved. Idle. F. W. Patterson Estate, owner, Fresno.

Mountain King Mine (quartz). At Pine Grove. Comprising the Mountain King, Mountain Queen, Mountain Queen Mill Site claims. Developments consist of shaft 300 feet deep, and crosscut tunnel 240 feet long. Two men employed driving east drift on tunnel level. W. B. Pitts of Pine Grove, owner.

New Albany Consolidated Mines (quartz). See our Report XII, p. 78. They are on the Mother Lode, south of Jackson, and comprise Albany, Astoria, Elephantine, Hollywood, Middle Bar and New Albany. All idle. New Albany Consolidated Gold Mining Company, owner. Martin Jones of San Francisco, agent.

New York Mine (quartz). See our Reports X, p. 123; XI, p. 140; XII, p. 78. It is 3 miles west of Jackson. Idle. G. W. Anderson Estate, owner, Stockton.

North Star Mine (quartz). See our Reports VIII, p. 71; X, p. 99; XII, p. 78. Idle. E. C. Voorhies of Sutter Creek, owner.

Oneida (quartz). See our Reports VIII, p. 79; X, p. 109; XII, p. 78; and Bulletin 18, pp. 60–63. It is 1½ miles north of Jackson joining the Kennedy on north. Workings consist of a vertical shaft 2280 feet deep sunk in the hanging-wall. The shaft cut the vein at the 1900-foot station. On 2200-foot level a winze was sunk on the vein 280 feet north of shaft to a depth of 280 feet. At 1200-foot level a crosscut was driven west 500 feet, connecting with workings of old incline shaft, which has a depth of 1350 feet. The Oneida workings are connected with the South Eureka on the 1800-foot level. The Oneida vein lies in the Mariposa slates, near the contact with the meta-andesite on the west. The ore shoots on this property have a general trend toward the north, the ore developed in lower workings is low grade. There is a 60-stamp mill on the property. Development work and pumping operations are being carried on. Eight men are employed. South Eureka Mining and Milling Company, San Francisco, owner. W. H. Schmal, superintendent.

Original Amador Mine (quartz). It is in Amador City. Comprises the original Amador, East Amador, Amador Wedge, Great Eastern, Eclipse Extension, Last Chance, with 4400 feet on the lode. A system of parallel veins has been developed on this property. The principal work has been on the main contact vein which has a Mariposa slate foot-wall and a diabase hanging-wall. It is in the form of a massive vein of quartz from 20 to 50 feet wide. About 20 feet west of contact vein a stringer lead in the footwall slates has been developed, which shows 6 to 8 feet of good ore. To the east of main vein there is a series of parallel veins in the diabase which have a filling slate and quartz stringers. These veins have an average width of from 12 to 20 feet. Work is carried on through an incline shaft 780 feet deep, sunk on an angle of 72° to the 200-foot level, and on a 45° incline to 700-foot level. All ore milled is being extracted from development work, and no stoping is being done. Owing to the extent of the ore body and the hard character of the walls, the shrinkage stope method is used in taking out the ore.

For drawing ore from stopes cribbed chutes 4′ x 7′ with manway 3′ x 4′ made of 4″ x 6″ lumber, and spaced 30′ apart are in use. The ore is hoisted in 1¼-ton skips by double drum hoist driven by 60 h.p. Atlas gas engine. Air for drills furnished by (16″ x 14″) (10″ x 14″) Ingersoll-Rand compressor driven by 100 h.p. motor. Sullivan stoping drills are used for drifting, stoping and raising operations, water being furnished to each drill.

Mill: 20 stamps weighing 1000 pounds dropping 6″, 110 drops per minute, crushing 4½ tons to the stamp through 20-mesh screen. The pulp from amalgamating plates flows to a 3-spigot classifier. overflow going to settling tank, the coarse sands to three Deister sand tables and the slimes from settling tank to four Deister slime tables. The middlings from concentrators go to collecting sump, joining the overflow from settling tank, from which they are pumped by 1½″ centrifugal pump to 8-foot Callow cone; the overflow goes to waste launder, through-size to 6-foot vanner. The concentrates from all the tables go to collecting sump whence they are pumped to settling bins, 3 compartments, capacity of 50 tons to the compartment. Stamps are driven by 75 h.p. motor, and concentrators by 10 h.p. motor. An extraction of 90% is made by amalgamation and concentration. Tailings assay 35¢ per ton. Concentrates have a value of $80 per ton. Total operating costs are $2.56 per ton. Thirty-two men are employed. Original Amador Consolidated Mines Company, 1225 Broadway, Oakland, owner. T. S. O'Brien, superintendent.

The Original Amador Mine, showing headframe and 20-stamp mill. Amador City, Amador County, California.

Penavita Mine (quartz). It is 12 miles east of Volcano. In granodiorite formation. Three tunnels on northwest and southeast vein 50 feet, 100 feet and 200 feet in length. Frank Berg, of Defender, owner.

Philadelphia (Richmond) Mine (quartz). See our Report XII, p. 78. It is 4 miles north of Plymouth. The vein has a course of north and south, with dip of 70° E. Tunnel 600′ long on vein. There is a 20-stamp mill on the property. Idle. J. J. Crawford Estate, owners, San Francisco.

Pigeon Mine (placer). It is 1½ miles northwest of Oleta. The course of channel is northeast and southwest, capped with andesitic tuff 100 feet thick. Width of channel is 150 feet with depth of gravel from 4 to 8 feet. Development consists of bedrock tunnel 200 feet long. The gravel is cemented. Idle. Fred Pigeon Estate, of Oleta, owner.

Pioneer Mine (quartz). See our Report XII, p. 78. It is ½ mile south of Plymouth. The vein occurs in broad belt of Mariposa slates. Shaft 550 feet deep, caved. There is a 20-stamp mill on the property. Idle. Dr. Thomas Boyson, of Plymouth, owner.

Plymouth Consolidated Gold Mines (quartz). See our Reports VI, Pt. II, p. 15; VIII, p. 42; X, p. 117; XII, p. 79. Bulletin 18, pp. 82–83. This property is at Plymouth and comprises the following claims: Southerland, Simpson and Aden, Oaks, Pacific, Indiana, Reese and Woolford, Phœnix, Plymouth, New London, Rising Star, East Phœnix, East Pacific, 4800′ on the lode. There are three parallel veins on the property, occurring in a broad belt of Mariposa slates. The general course of the veins is north and south with dip of 65° E. The Pacific shaft is 1520′ deep, vertical, the remaining distance of 520′ being sunk on 55° incline; 3 compartments 5½′ x 4′ in clear. There is a curve in the shaft starting 80′ above 1600-foot level. This curve is 155′ long with a 280-foot radius. The shaft is sunk in footwall of vein from 1600-foot to 2000-foot level. Since the reopening of this property good pay ore has been developed on the 950′, 1065′, 1140′, 1220′, 1400′, 1500′, 1600′, 1850′ and 2000-foot levels, on the Empire-Pacific vein, which has an average width of 12 feet. Crosscuts have been driven east from shaft a distance of 130′ to 165′ cutting the Empire-Pacific vein. At the 1500-foot level a hanging-wall vein was cut 27 feet east of Empire-Pacific vein. This hanging-wall vein intersects the main vein forming an ore shoot on 1600-foot level. At a distance of 1500′ north on 1140-foot level, a crosscut was driven east 175′ cutting hanging-wall vein. On the 1600-foot level south the vein has a width of 24′ with an average value of about $6 per ton. While on the north ore shoot on the

2000-foot level, the width of ore developed is 16′ with an average assay value of $17 per ton.

Plymouth Mill: The ore is hoisted from the mine in 2-ton skips to a 2-story hopper, the upper part being used for waste and the lower for ore; the capacity of ore bin is 120 tons. From the latter the ore is fed to a No. 5 Gates gyratory crusher, the discharge of which falls onto a 20-inch belt conveyor, which conveys the ore for a distance of 630 feet to top of mill. The maximum slope of conveyor is 21° 15′. The conveyor is made up in two sections with a length of 315 feet each. The individual sections are driven by 10 h.p. Fairbanks-Morse motors. The ore from conveyor discharges onto 16-inch automatic Link belt distributor which distributes the ore to 1400-ton bin. From the ore bin, the ore is fed by Challenge machines to 30 stamps, weighing 1250 pounds, which drop 98 times per minute, with 7-inch drop, order of drop being 1–3–5–2–4. Stamp duty is 15 tons per stamp per twenty-four hours through ¼-mesh screen. Only 20 stamps are being used at present, 10 being kept in reserve. The pulp from batteries goes to a distributing box and automatic sampler, from which the material is fed to two 18-inch Caldecott cones. The overflow from cones goes to two 44-inch Caldecott cones, while the overflow from the latter flows to amalgamating plates. The sands from 18-inch and 44-inch Caldecott cones flow to two 8-foot by 22-inch Hardinge mills, which make 27 r.p.m., the pebble feed being 200 pounds per day. The pulp from Hardinge mills joins overflow from cones and passes over 10 double compartment amalgamating plates 6′ x 14′ in size. The plate tailings pass through

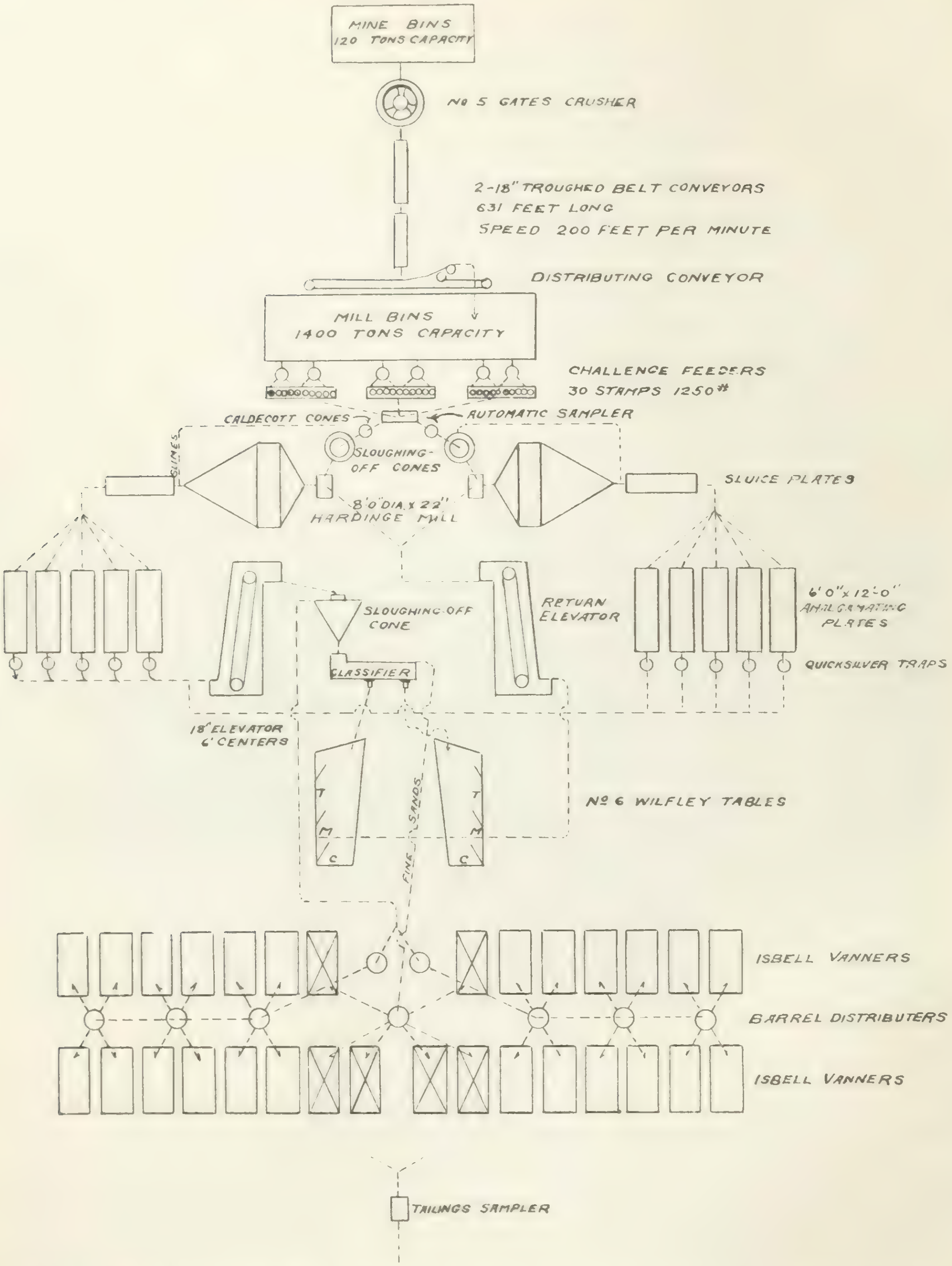
Headframe at Pacific Shaft; also showing timber and machine shops. Plymouth Consolidated Mines, Plymouth, Amador County, California.

amalgam traps, and are elevated by 36-foot bucket elevator to 5 feet 8 inches Callow cone; overflow from Callow cone laundered to two barrel type distributors which distribute to twenty-four 6-foot Isbell vanners. The pulp from two upper barrel distributors is laundered to lower barrel distributors. One barrel to each four vanners. Sands from 5 feet 8 inches Callow cone flow to a 2-compartment Richard hindering settling classifier. The overflow from classifier is laundered to two barrel distributors, which distribute to six 6-foot Isbell vanners. Discharge from Richard classifier flows to two No. 6 Wilfrey tables. Middlings from Wilfrey tables returned to Hardinge mills by 22-foot bucket elevator. This combination of stamps and Hardinge mills yields a product, 90% of which will pass through a 40-mesh screen, and the production of slime and calloidal matter appears to be considerably less than is the case in other Mother Lode plants where the ore is crushed directly through a fine screen.

Plymouth Consolidated Mines Company's 30-stamp mill, Plymouth, Amador County, California.

The plant is crushing 300 tons per day but its ultimate capacity is about 350 tons per day. The amalgamation is done on the outside plates. The concentrates from Wilfrey tables have an assay value of $150 per ton, while concentrates from vanners assay $60 per ton. The tailings run about 60 cents per ton. An extraction of 90 per cent is made by amalgamation and concentration. The mill is run by electric power, the Hardinge mills being driven by a 225 h.p. motor while the rest of the mill is driven by 100 h.p. One hundred and fifty-eight men are employed. Plymouth Consolidated Gold Mines, Limited, 20 Copthall avenue, London, England, owners. Albert Burch, general manager. James Parks, superintendent.

Plymouth-Eureka Mine (quartz). It is 1 mile northwest of Plymouth. In diabase formation to west of Mother Lode belt. Shaft 50 feet deep. Two men are employed. J. Ninis, of Plymouth, owner.



Flow Sheet of Plymouth Mill, Plymouth, Amador County, California, by Gelasio Caetani.

Pocahontas Mine. See our Bulletin 18, page 83. This property is 1½ miles east of Drytown and includes the Pocahontas, Edson, and California. A vertical shaft has been sunk to a depth of 620 feet, with six levels. Three veins have been developed in a black tufaceous slate. There is a steam hoist and 10-stamp mill on the property. Idle. W. F. Detert, of Jackson, and Allen McWayne, of Drytown, owners.

Posey Hill Mine (placer). It is 5 miles northeast of Volcano. Idle. George Hadley, Volcano, owner.

Rancheria Mine (placer). It is 5 miles northwest of Volcano. The channel is 200 feet wide with a depth of gravel of 6 to 8 feet, which is capped by an andesitic tuff 150 feet thick. Bedrock tunnel 500 feet in length. Four men are employed. Elmer Evans et al., of Volcano, owners.

Red Cloud Mine (quartz). It is 2½ miles northeast of Plymouth, adjoining the Easton mine on the north. Workings consist of an incline shaft 275 feet deep. Idle. Glauch Bros. et al., of Oleta, Cal., owners.

Red Cloud Mine (hydraulic). It is situated 12 miles southeast of Ione. Hydraulicking a 6-foot bank of loose gravel wash. Four men are employed. Edgar Ekel, of Lancha Plana, owner.

Red Tape Mine (quartz). It is 6 miles south of Volcano, on ridge north of the North Fork of the Mokelumne River. Includes the Red Tape, Silver Pick, and Oro Grande. The vein has a course of north and south, cutting the granodiorite formation. Workings consist of a shaft 110 feet deep and a tunnel 500 feet in length, 100 feet below collar of shaft. Four men employed sinking shaft. Oscar Lofstead, of Defender, owner.

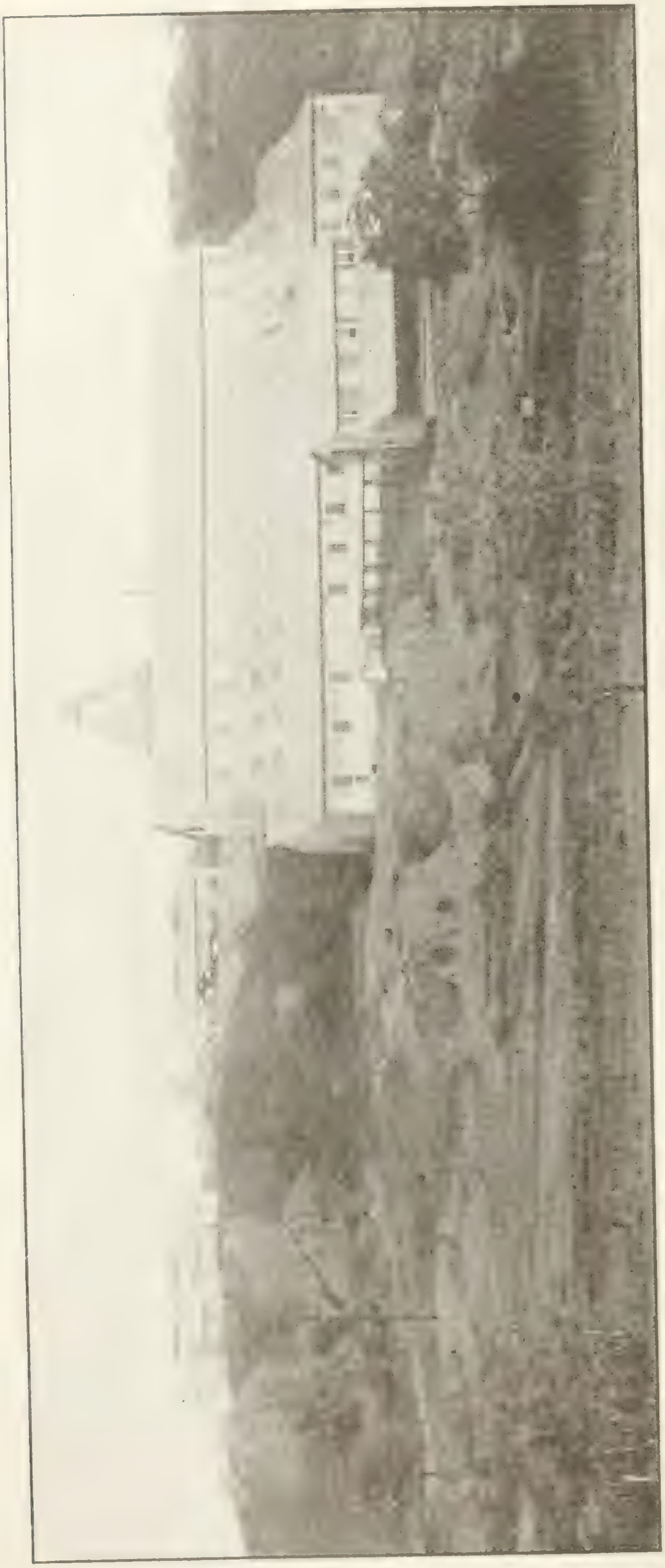
Reward (*Clough*) *Mine* (quartz). It is on the Clough ranch, ¾ of a mile east of Pine Grove. Incline shaft 100 feet deep. Idle. Reward Gold Mining Company, 519 California street, San Francisco, owner.

Sargent and Marlette Mines (quartz). The property is situated 4 miles south of Jackson, on Mokelumne River. Workings consist of an incline shaft 120 feet deep on Sargent claim. On the Marlette claim there is a crosscut tunnel 170 feet to vein, with drift north 300 feet and a winze 200 feet deep in north drift. Idle. Mrs. Julia Sargent, of Jackson, owner.

Seaton Mine (quartz). It is 1 mile east of Drytown. The vein is distinguished by a massive outcrop of quartz, occurring on the contact between the Mariposa slates on the west and diabase on the east. There is a shaft sunk on the vein to a depth of 950 feet, on an angle of 65°. Idle. A. Hayward Estate, of San Francisco, owner.

Shenandoah (*Easton*) *Mine* (quartz). It is 1½ miles northeast of Plymouth. A shaft was sunk on the vein to a depth of 1200 feet on angle of 58°. No pay ore was developed. Mrs. Hilda Brown, of New York City, owner.

South Eureka Mine (quartz). See our Reports X, p. 113; XI, p. 144; XII, p. 79; Bulletin 18, pp. 63, 64. This mine is 1 mile south of Sutter Creek, adjoining the Oneida on the north. The slates are capped with a Neocene andesite about 25 feet in thickness, so there are no croppings of the vein where the shaft was sunk. The vein is a northern exten-



Steel headframe and mill at the South Eureka Mine, Sutter Creek, Amador County, California.

sion of the Kennedy, Argonaut, and Oneida lead. The north shaft is down 2785 feet on a 67° incline. There are two hoisting compartments 5′x4′ and a manway 5′x2′ in the clear. The south shaft is 880 feet southeast of main shaft, and has a vertical depth of 600 feet. Three veins have been developed, namely: hanging-wall, footwall, and middle, which occur in the black slates and greenstone schists. Numerous lenses of greenstone are encountered in the slates, which fault the vein. The north shaft intersects the hanging-wall vein at 1700-foot level, from which point the shaft was sunk on the vein to the 2000-foot level, the remaining distance being in the footwall of the vein. At a point below the 2000-foot level, the middle and footwall veins form one ore body. Most of the pay ore developed on lower levels is found on the latter vein. The ore shoots have a trend towards the north. Ore is hoisted from the mine in 2-ton skips by double drum electric hoist driven by two 400 h.p. motors with 24-rope transmission drive. Two (16″x14″) (10″x14″) Ingersoll-Rand compressors, each driven by 100 h.p. motor, furnish air for drills.

Mill: This mill contains 80 stamps, weighing 1150 pounds, dropping 6½ inches, 100 times per minute, crushing 5 tons through 24-mesh screen. Each battery of 20 stamps is driven by a 50 h.p. General Electric Company motor. Pulp from amalgamating plates is treated on forty-eight 6-foot Frue vanners. An extraction of 85% is made by amalgamation and concentration, with a loss in the tailings of 54 cents per ton. The concentrates recovered have a value of $100 per ton. The total operating cost per ton is $2.80. South Eureka Mining and Milling Company, owner, San Francisco National Bank Building, San Francisco. W. H. Schmal, superintendent.

South Jackson Mine (quartz). It is ½ mile southeast of Jackson. Three veins have been developed on this property: West, Middle and Zeila. The Zeila vein occurs on the contact between the black clay slates and the amphibolite schist, while other veins occur in the slates to the west. A 3-compartment, 5′x12′ in clear, vertical shaft has been sunk to a depth of 577 feet, with levels at 210 feet, 345 feet and 500 feet. On the 210-foot level a crosscut has been driven 90 feet west. At the 345-foot level, a crosscut is driven west 280 feet cutting a vein 80 feet west of shaft, which has been drifted on 312 feet north and 383 feet south. The vein in both faces shows a width of 5 feet of quartz with a gouge on the footwall. On 500-foot level a crosscut has been driven east 1035 feet, cutting middle vein 20 feet wide, with a drift north on this vein for a distance 260 feet, and south 130 feet. In this crosscut the Zeila vein was cut 750 feet east of shaft, with a drift north on it for a distance of 100 feet.

Equipment: 50-foot headframe, double drum electric hoist driven by 75 h.p. General Electric motor, 16″x12″ Chicago Pneumatic Tool Company compressor driven by 75 h.p. motor. Four men are employed on development work. South Jackson Mining Company. J. Schweitzer, superintendent.

Headframe at the South Jackson Mine, Jackson, Amador County, California.

South Spring Hill Mine (quartz). See our Reports VIII, p. 80; X, pp. 73, 98; XI, p. 145; XII, p. 79; Bulletin 18, p. 77. It is ½ mile south of Amador City, adjoining the Keystone on the south. Comprising the Medean, South Spring Hill, Talisman claims, also the Gorton ranch. There are three shafts on the property: South Spring Hill shaft is 1200 feet, Talisman 600 feet, and Medean 600 feet in depth. The two former shafts are sunk on the contact vein with the Mariposa slates on the west, and diabase on the east, while the latter shaft is on a parallel lead to east in the greenstone. Idle. South Spring Hill Mining Company, owner, Lemonston, Mass. John R. Tregloan, of San Francisco, agent.

St. George Mine (quartz). It is a prospect 1½ miles north of Plymouth. Idle. Thomas George et al., owner, Plymouth, Cal.

St. Juneau Mine (quartz). It is 4 miles south of Jackson, on the ''black metal'' belt to west of the Mother Lode. There is a tunnel 1000 feet in length on property. Idle. A. Caminetti, of Jackson, owner.

Sunnyside Mine (drift). It is 2 miles south of Oleta. The gravel is partially cemented. Workings consist of a bed rock tunnel 700 feet in length. It is on the same channel as the Clark mine. Two men are employed. W. S. Clark, owner, Oleta.

Sutter Creek (*Treadwell*) *Mine* (quartz). It is 5 miles west of Volcano. The vein has a course of N. 25° W. dipping 80° E. Average width of vein is 3 feet. The formation is slate. The vein has been developed by three tunnels, 300, 200 and 200 feet in length. There is a 5-stamp mill on the property. Idle. J. J. Hall, J. B. Grillo, owners, Volcano.

Tellurium Mine (quartz). See our Report XII, page 79. It is 1 mile north of Pine Grove. Vein strikes northeast and southwest dip 65° E. Average width of 2 feet. The formation is a mica schist. Workings consist of a shaft 300 feet deep and tunnel 1450 feet in length, connecting with shaft on 200-foot level. Idle. W. S. Straub, of Oakland, owner.

Tierakoff Mine (quartz). See our Report XII, p. 92. Situated 5 miles southeast of Volcano. In granodiorite formation. Comprising Golden Eagle, Lucky Girl and Badger claims. Tunnel on the Golden Eagle claim being a crosscut 400 feet to vein with drift north on vein for 500 feet. Tunnel 250 feet in length on Lucky Girl claim. There is a 5-stamp mill on property. Three men are employed. W. A. Marchand, owner, Defender.

Treasure (*Hazard*) *Mine* (quartz). See our Report XII, p. 77. Situated 1½ miles north of Amador City. The vein occurs on the contact between the Mariposa slates on the west and meta-andesite on the east. A hanging-wall and footwall veins have been developed, also a schist ore body to south of the shaft on the 1000-foot level. The Treasure shaft has been sunk to a depth of 1650 feet on a 50° incline, with levels at 375, 810, 1000 and 1600 feet. On 375-foot level there is a drift north 500 feet and south 500 feet on vein. At 810-foot level there is a crosscut west to vein a distance of 70 feet, with drift north

The Treasure Mine, showing hoist and headframe, Amador City, Amador County, California.

350 and south 300 feet. On 1000-foot level, crosscut west 80 feet from shaft to vein, with drift north 700 feet and south 800 feet. At 1600-foot level, crosscut 120 feet west to vein with drift south 400 feet and north 300 feet. A schist ore body has been developed on the footwall of gouge on 1000-foot level south forming an ore body 700 feet long and 18 feet in width.

On this level the hanging-wall and footwall veins form a juncture with main vein 250 feet south of shaft, but to the north the values pinch out, although the gouge continues. The main vein is in the slates to the 400-foot level, and has a dip of 45° at which point it straightens, having a dip of 65° to 70° each and passes into a schist formation. Two shoots of ore have been developed on main vein having an average width of 6 feet, with a length of 90 to 400 feet. A record in shaft sinking on the Mother Lode has been made at this mine, both in regard to cost and speed. Cost in sinking shaft 9′ by 4½′ in clear of timbers, and 12½′ by 6½′ in clear of rock. The distance sunk being 618 feet.

Labor	$8 03	per foot	$1 07	per ton
Top labor	3 86	" "	0 51	" "
Overhead charge (superintendent, city office, insurance)	2 22	" "	0 29	" "
Powder	3 42	" "	0 45	" "
Timber (10″x10″)	0 96	" "	0 12	" "
Power	1 58	" "	0 21	" "
Vent pipe 12″ diameter, 20 gauge	0 43	" "	0 05	" "
Track spikes, etc.	0 77	" "	0 10	" "
4″ black iron air pipe	0 35	" "	0 04	" "
Electric exploders	0 06	" "	0 003	" "
Fuse	0 01	" "	0 001	" "
Coal	0 22	" "	0 030	" "
Calcium carbide	0 05	" "	0 007	" "
Water	0 026	" "	0 003	" "
Oils, grease, waste	0 060	" "	0 007	" "
Depreciation: 4-B.A. Ingersoll hand drills	0 350	" "	0 047	" "
Extras for drills	0 044	" "	0 006	" "
Steel, broken, lost and used	0 457	" "	0 061	" "
Five 50-foot lengths of hose	0 078	" "	0 010	" "
Shovels, picks and winches	0 019	" "	0 002	" "
Placing 400 feet of pipe	0 019	" "	0 003	" "
Placing 1236 feet 3-8″ bell rope	0 099	" "	0 013	" "
Telephone charge	0 026	" "	0 003	" "
Total cost	$23 65	per foot	$3 15	per ton

Average footage made per month was 110 feet. The average number of hours to drill and fire a round of twenty-one holes having a depth of 3.7 feet was 7.26 hours. The drills used in sinking operations were 4-B.A. 26, Ingersoll-Rand hand operated butterfly valve drills. Fourteen men employed. Treasure Mining Company, 1128 Merchants Exchange Building, San Francisco, owner. E. S. McCurdy, superintendent.

The Zeila Mine, Jackson, Amador County, California.

Valparaiso Mine (quartz). It is 4½ miles south of Jackson, comprises the Wedge, Media and Valparaiso claims. Situated on what is termed the "black metal" belt. Mined for rich pockets encountered in a belt of black slates west of the Mother Lode. Workings consist of a tunnel 1300 feet in length, with a winze 130 feet deep, about 750 feet from mouth of tunnel. Idle. D. Boro, E. Garibaldi et al., owners, Jackson.

West Eureka (Alpha) Mine (quartz). At Sutter Creek, adjoining the "Old Eureka" claim on the east. Developments consist of a shaft 100 feet deep, and crosscut tunnel 85 feet in length, which cut a 20-foot vein, with drift south on vein for a distance of 200 feet. The south drift intersects the shaft at a depth of 30 feet from surface. Idle. John Ross, E. D. Botta et al., owners, Sutter Creek.

Wildman Mine. (See Lincoln.)

Zeila Mine (quartz). See our Reports VIII, pp. 68, 85; X, pp. 68, 104; XI, p. 139; XII, p. 80; XIII, p. 79; Bulletin 18, pp. 45–50. Situated in the southern limits of the town of Jackson. Comprises the following claims: Coney and Bigelow, Blue Jacket, Flemming; also Trowbridge, Nunner and Keeney ranches, with 5280 feet on the lode. This mine is on the east vein of the Mother Lode, confined to a contact of a narrow strip of slatey Calaveras schist on the west and the main belt of amphibolite schist on the east. A diorite dike 4 to 5 feet wide accompanies the vein. The vein has an average width of 20 feet with dip of 60° E. The ore is low grade, averaging less than $4 per ton. The shaft has been sunk 1700 feet on an angle of 65°. On the 1570-foot level a drift has been driven 3000 feet north, where a winze was sunk on the vein to a depth of 458 feet. At a depth of 157 feet below this level, there is a drift 352 feet north on the vein. Also at a depth of 295 feet, the vein has been developed for a distance of 450 feet north. This property has been recently closed down, after 30 years of continuous operation. All machinery is being dismantled and sold. Zeila Mining Company, Jackson, owner. W. F. Detert, of Jackson, agent.

IRON AND MANGANESE.

Two miles west of Ione there is a large deposit of impure hematite in the Ione formation. There is also a deposit in the Calaveras formation about ½ mile northwest of Clinton.

LIME AND LIMESTONE.

There are numerous lenses of limestone in the Calaveras formation in this county.

Amador Lime Rock Company Quarry. Situated about 4½ miles northeast of Ione, on the Bonham ranch. The deposit is a compact blue gray, stratified limestone, which is quarried by hand. This deposit shows a thickness of more than 100 feet. The lime is burned for local use in an intermittent stone kiln. Three men employed. Amador Lime Rock Company, owner, Jackson. W. F. Detert, manager.

Hodge Limestone Quarry. In Sec. 33, T. 7 N., R. 10 E., about 3 miles north of Ione. The croppings can be traced on this ranch for over ½ mile, with a width of 150 to 200 feet. Idle. Alexander Hodge, owner.

MARBLE.

Amador Marble Quarry. Situated 2½ miles east of Plymouth, in canyon of Dry Creek. The marble occurs in a heavy ledge, about 100 feet thick, lying in a schist formation. The quarry face is a little over 100 feet in height and about 100 feet wide. The stone is a light gray and blue clouded marble. Idle. T. A. Dal Porta, owner, Plymouth.

Carrara Marble Quarry. The quarry is located in Sec. 29, T. 7 N., R. 12 E. The principal product is white marble with black streaks. Idle. C. Dondero, owner, San Francisco.

SANDSTONE.

Barnett Sandstone Quarry. See our Bulletin 38, p. 117. In Sec. 27, T. 5 N., R. 10 E., Richard Barnett, Ritchey post office, owner; about 8 miles south of Ione. The products are red and white sandstone. The quarry face on red sandstone shows a maximum thickness of from 18′ to 20′ in one massive bed, which lies with a slight dip to the north. About 100 yards north of the red sandstone quarry, and from 30′ to 40′ higher on the hill, a small opening has been made into a massive snow-white sandstone. The thickness of this stone exposed is about 10 feet. It is a beautiful building material and is pure and free from iron.

TALC.

On the Tonzi ranch 6 miles northeast of Ione, in Sec. 4, T. 6 N., R. 10 E., there is a deposit of light green talc, which outcrops in several places. Joseph Tonzi, of Ione, owner.

CALAVERAS COUNTY.

Field work in March, 1914.

Introduction.

Calaveras County is bounded on the north by Amador, on the east by Alpine, on the southeast and south by Tuolumne, on the southwest and west by San Joaquin County.

The Mokelumne River, on the northwest, separates Calaveras from Amador County, while the Stanislaus, on the southeast, separates it from Tuolumne. It is the central one of the Mother Lode counties, and it is centrally located relative to the entire auriferous slate belt of the Sierra Nevada slope.

All physical conditions are favorable to mining, there being an abundant supply of timber and water. The county is richly mineralized throughout, presenting several belts and districts.

The Mother Lode crosses the county along a thirty-mile course, and in this county displays the characteristics of vast bodies of low and medium grade ore, presenting mining propositions of the sort now especially attractive to conservative mining capital. On this lode, at the northern side of the county, is the noted Gwin mine; by the southern boundary is the Melones, one of the largest mining properties in the State, and between them is the Angels Camp group of mines consisting of the Utica group, one of the ranking gold mines of the country, also the Angels and Lightner mines; with other important mines intermediate along the lode.

The east and west belts are noted for gold resources, which are now attracting marked attention. The auriferous gravel deposits of the ancient river channels aggregate over fifty miles in length, and there has been an increased activity in placer mining in these channels, especially in the neighborhood of Mokelumne Hill, which camp promises to be a large gold producer again.

Three dredges are under active operation on the Calaveras River near the town of Jenny Lind, another dredge is in operation on the Mokelumne River near Comanche, and active prospecting operations are under way to open up new dredging ground on both these rivers.

Besides being notably rich in gold, Calaveras possesses large and valuable copper mines, and deposits of clay, iron ore, limestone, marble and sandstone.

Railway Facilities.

The county has the advantage of direct communication with the principal trade centers by means of railroads, which enter the county at three different points—on the north at Valley Springs, farther south at Milton, and on the extreme southern end at Melones. From the

CALAVERAS COUNTY. Table of Mineral Production.

Year	Gold	Silver	Copper		Mineral paint (ochre)		Clay		Mineral water		Limestone		Chrome		Quartz crystals	Miscellaneous and unapportioned	
	Value	Value	Pounds	Value	Tons	Value	Tons	Value	Gallons	Value	Tons	Value	Tons	Value	Value	Kind	Value
1880	$320,865	$643															
1881	800,000	1,200															
1882	670,000															Unapportioned, 1900-1909	$50,075
1883	500,000																
1884	485,000																
1885	527,538	2,558															
1886	639,457	4,926															
1887	640,417	1,477															
1888	580,000	1,500															
1889	592,243	1,071															
1890	618,821	2,499															
1891	738,883	4,860															
1892	794,531	24,441															
1893	1,669,192	122															
1894	2,119,365	5,183	654,866	$64,951	115	$2,530											
1895	1,717,916	77	175,895	16,925													
1896	1,546,398	500	87,557	8,990													
1897	1,439,861	1,745			150	2,400											
1898	1,019,023	3,462	18,400	2,052	100	225											
1899	1,265,564	9,813	165,484	27,586													
1900	1,649,126	80,762	980,934	150,585	400	3,800									$18,000	717 tons pyrites	3,583
1901	2,024,685	44,687	1,701,389	268,000	125	500									17,500		
1902	2,072,939	46,234	2,087,501	251,062	259	778											
1903	1,904,125	68,280	2,246,675	297,263	200	1,000											
1904	1,789,184	65,611	2,592,124	414,399	70	385	100	$100			Lime, 3,500 bbls.	$5,500	25	$375			
1905	1,836,816	78,859	3,636,810	572,022	379	1,900	40	300			Tons, 3,087	15,430	20	300	10,000		
1906	1,644,234	74,099	5,082,320	956,315			50	250			3,994	7,635	40	280		13.9 ounces platinum	250
1907	1,097,974	54,420	3,941,883	609,203							6,872	16,955			10,000		
1908	1,378,511	62,727	4,804,446	555,704	50	250	25	250			14,165	31,446			10,000		
1909	1,440,511	71,418	5,438,908	690,632			100	500			4,590	11,987					
1910	1,147,705	82,866	7,345,321	778,369			30	250			6,283	16,976					
1911	1,112,315	67,032	6,190,153	773,769			50	200	10,000	$5,000	3,948	11,733				220 pounds lead	10
1912	962,145	70,748	6,125,415	1,010,693			4,281	4,431	7,528	3,764							
1913	1,175,208	61,076	5,063,187	784,794	28	190	2,000	4,500	11,500	5,500	2,000	1,400				2,500 pounds graphite 7,006 pounds lead Other minerals	25 308 9,900
Totals	$39,920,552	$994,896	58,369,268	$8,233,314	1,876	$13,958	6,676	$10,781	29,028	$14,264	44,934	$119,062	85	$955	$65,500		$64,151

Total Mineral Production, 1880 to 1913, inclusive.

Chrome	$955
Clay	10,781
Copper	8,233,314
Gold	39,920,552
Lime	5,500
Limestone	113,562
Mineral paint	13,958
Mineral water	14,264
Quartz crystals	65,500
Silver	994,896
Miscellaneous and unapportioned	64,151
Total	$49,437,433

Introduction.

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Mineral Resources.

The mineral resources of Calaveras County consist of asbestos, chrome, clay, copper, gold, limestone, marble, mineral paint, mineral water, platinum, pyrite, quartz crystals, stone industry and silver.

ASBESTOS.

California Asbestos Mine. Situated 6 miles southeast of Copperopolis on ridge northwest of the Stanislaus River, in Secs. 21, 22, T. 1 N., R. 13 E., there is a small deposit of asbestos in a belt of serpentine, upon which a small amount of work has been done, but as yet no marketable amount has been developed. The fiber is very short, usually from ½ inch to 1½ inches in length. Idle. California Asbestos Company, San Francisco, Cal., owners.

CHROME.

Chromite deposits near Valley Springs. The chromite deposits near Valley Springs occur in the central belt of discontinuous serpentine areas, extending in a northwesterly and southeasterly direction through southwestern Calaveras. The portion of the belt near Valley Springs is parallel to and just west of the Mother Lode district. The chromite deposits occur at intervals along the serpentine belt in this district and continue to the north and south. The Valley Springs deposits are in several groups, south, east and north of Valley Springs.

Vogelsang Ranch. The chrome deposits on the Vogelsang ranch are about a mile south of the Calaveras River and about five miles southeast of Valley Springs. They consist of a series of lenses of varying size in serpentine arranged along a trend of approximately N. 45° W. Chromite can be traced for from 600 to 700 feet along the strike; in this distance five to six lenses outcrop. All have their larger diameter parallel to the strike and are separated from one another by barren stretches of several hundred feet. The largest lens has a width of ten feet and a length of from 40 to 50 feet. The lenses are nearly vertical or dip to the northeast; they occur in the serpentine 25 feet from its contact with the amphibolite schist, the string of deposits running along northeast of this contact and nearly parallel with it.

The ore is very pure, glossy black and coarsely crystalline. It is hard, heavy and massive and can be removed in large fragments. These lenses are very irregular in their occurrence. The contact of the chrome and serpentine is sharp, little or no chrome occurring in the wall rock, and no serpentine in the ore. Some ore was shipped from these deposits in the past for use as furnace linings at the Campo

Seco smelter. The depth of these deposits can not be estimated, but there is at least from 500 to 1000 tons of ore in sight. G. D. Vogelsang & Bros., of Valley Springs, owners.

Other Deposits. Several small occurrences of chrome are about five miles north of Valley Springs and south of Mokelumne River, in a continuation of the same serpentine belt. Other deposits are in isolated serpentine areas on the west slope of Bear Mountain, 10 miles northeast of Milton on the Wright ranch, also on the Tower ranch in Salt Spring Valley, about 9 miles east of Milton.

There is a deposit on the Nassau Copper Company's property, on the Milton and Angels road, 4 miles north of Copperopolis.

CLAY.

A variegated clay of good quality is being quarried at Valley Springs and shipped to the California Pottery Company of San Francisco for making pottery.

COPPER.

Geology of Copper Belt. The copper belt in Calaveras County crosses the western end of the county through the foothills in a northwesterly direction, being separated from the Mother Lode belt by the Bear Mountain Range of mountains, forming two distinct lodes.

The western lode, near the northern end of the county at Campo Seco, a distance of three miles west of the Copperopolis lode, has been extensively developed by the Penn Mining Company group of mines. Showing strong veins in amphibolite schist formation, the ores carry some gold, silver and zinc. In the south side of the county at Copperopolis is what is termed the Copperopolis lode developed by the Calaveras Copper Company group of mines. The formation in which these mines occur is a black pyritous slate in a belt of amphibolite schists. The ores being different from the Campo Seco belt in that they do not carry any gold and silver values. The continuity of this lode is shown by the croppings and numerous shafts sunk along the lode at different points.

Mines.

Bell Prince Mine (copper). Located ½ mile west of Campo Seco; developments consist of three shafts 22, 61 and 100 feet deep. Prospect. Idle. W. H. Gallagher, of Campo Seco, owner.

Bund Copper Mine. It is 7 miles south of San Andreas. Vein occurring on contact of amphibolite schists and serpentine. Three shafts on vein to depth of 50 feet, 75 feet and 108 feet. Idle. Constant Bund of Fourth Crossing, owner.

Campo Seco Mine (copper). Situated 1 mile south of Campo Seco, on the Valley Springs and Penn Mining Company road. Controls the following claims: Great Eastern, Copper King, Copper Queen, Great Eastern Fraction, comprising 53.3 acres. These claims join the Penn Mining Company's property on the east. The veins on this property can be easily traced by the heavy iron gossan capping exposed in many places on the surface. The east and west veins have been developed by two shafts, with depths of 115 and 93 feet. The vein matter is composed of talcose schist, clay and quartz. The ores are copper sulphides associated with pyrite. Idle. Campo Seco Mining and Development Company, Petaluma, Cal., owners. President, R. S. Brown of Petaluma.

Collier Mine (copper). It is located near the Napoleon Mine in the Gopher Range; shaft 100 feet deep. Caved. Geo. McM. Ross, of Stockton, owner.

Constellation (Constitution) Mine (copper). South of the property of the Penn Mining Company is the Constellation group of mines consisting of the following claims: Meteor, Constellation, West Constellation, and Constellation Placer mine, comprising 117 acres. The Meteor and Constellation are located on the southern extension of the east vein, while the West Constellation is on the west vein. A shaft has been sunk on the Constellation to a depth of 400 feet, and to the south of this shaft one sunk to a depth of 50 feet, cutting a vein 5 feet wide, assaying 3 per cent copper with gold and silver values. There is a boiler, steam hoist and compressor on the property. Constellation Mining Company, San Francisco, Cal., owner. W. V. Manners, president.

Diamond J. Mine (copper). It is 7 miles southwest of Copperopolis, on south slope of Hog Mountain. Shaft 120 feet deep. Idle. L. Shumate, of Copperopolis, owner.

Eagle Mine (copper). On Quail Hill, contains sulphide and carbonate ores. Idle. Mary L. McDonald, of San Francisco, owner.

Edna Mine (copper). Located 2 miles northwest of Valley Springs on the north slope of Table Mountain, shaft 50 feet deep on west vein and a tunnel 150 feet in length on east vein. The veins are capped by massive iron gossan croppings on the surface, which carry gold and silver values. The ores are sulphides associated with pyrite. Two men are employed sinking shaft. D. A. Nuner, of Valley Springs, owner.

Eureka Mine (copper). Prospect, 2 miles northeast of Campo Seco. Shaft 150 feet deep. Idle. W. H. Thacher, of Lodi, Cal., owner.

Holmes Mine (copper). Situated on ridge south of Campo Seco. Quartz vein in amphibolite schist formation, course of vein is east and west, dipping 75° to the south. The ores are chalcopyrite, pyrite, galena, sphalerite with a small percentage of gold and silver values. Developments consist of a tunnel 365 feet long on vein. Idle. W. A. Holmes, of Valley Springs, owner.

Ingomar Mine (copper). Located 1 mile northeast of Campo Seco, on ridge south of Mokelumne River. The vein lies between amphibolite schists and talcose shales, having an average width of 10 feet. The course of vein is N. 30° W. dipping 60° NE., the ore occurring in lens-shaped deposits in the schist. Developments consist of incline shaft 500 feet deep, with levels at 300 feet, 380 feet and 500 feet. There is also a series of shallow shafts and tunnels on the property. The iron gossan croppings were rich on the surface and in the past were extensively worked for the gold values. The property is on the extreme east end of the Campo Seco copper belt. There are boilers, steam hoist, compressor and 10-stamp mill on the property. Idle. Ingomar Mining Company, 54 Auzerais Building, San Jose, Cal., owners.

Napoleon Mine (copper). Located 10 miles southwest of Copperopolis, on Hog Mountain. The vein channel is about 100 feet wide, consisting of diabase and metadiabase to talcose schists. The ore bodies occur in lens-shaped masses from stringers to 20 feet in width. The surface croppings show a heavy iron gossan capping. The ores are copper sulphides mainly chalcopyrite associated with pyrite, with carbonates and oxides close to the surface. In 1881 shipped 1,600 tons of ore which gave an average assay of 11.25% Cu, 0.26 oz. Au, 5.7 oz. Ag. Leaching operations are being carried on, producing a copper cement assaying 75% copper.

Developments consist of a shaft 250 feet deep and a shaft 350 feet west, which is vertical for a depth of 100 feet then sunk on an incline at an angle of 62° to a depth of 300 feet, with drifts east and west on 100-foot, 250-foot, 300-foot, 400-foot levels.

The property is under lease to C. E. Olsen and D. E. Coughanauer, of Stockton, Cal. Peyton Chemical Company, Mills Building, San Francisco, Cal., owner.

Nassau Mine (copper). Situated 4 miles north of Copperopolis on the Copperopolis and Angels road. This property controls two patented claims, Goat Ranch and Goat Ranch Extension; also 1,560 acres of patented agricultural land, a total area of 1,600 acres, with a length of 15,840 feet on the lode. There is an ore zone 100 feet wide, which shows a vein with an average width of 10 feet. Course of vein is N. 35° W., with a dip of 65° NE. The ore occurs in a metadiabase in the form of lenses, consisting of a series of parallel high grade streaks in the schist, with a width varying from a few inches up to two feet. The ores are in the form of copper sulphides associated with pyrite, carrying a small percentage in gold and silver values, and as high as 15% zinc. Two shoots of ore have been developed. Ore shoot south of shaft has the following analysis: Au 0.35 oz., Ag 4.6 oz., Cu 8.3%, SIO_2 42.8%, Zn 2.6%, Fe 8.2%, S 25%.

Analysis of ore shoot north of shaft which shows high zinc values is as follows: Au 0.125 oz., Ag 4.60 oz., Cu 8.29%, SiO_2 40.8%, Zn 15%.

The sulphide zone is encountered within 30 feet of the surface. Developments consist of a vertical shaft having a depth of 280 feet with 95 and 200-foot levels. On the 95-foot level are drifts north 200 feet and south 800 feet. On the 200-foot level is a drift north 240 feet and south 820 feet. Operations consist of mining the high grade streaks and in shipping the ore to the smelter, also leaching with mine water, which water contains 0.68% copper, and a copper cement assaying 75 % copper is being shipped. Cost of freight haul from mine to Angels $2.00 per ton; cost of railroad freight from Angels to Selby smelter, $2.50 per ton.

General analysis of ore shipped is as follows:

Gold	0.20 oz.
Silver	4.60 oz.
Copper	5.22%
Silica	39.00%
Iron	11.90%
Zinc	17.90%

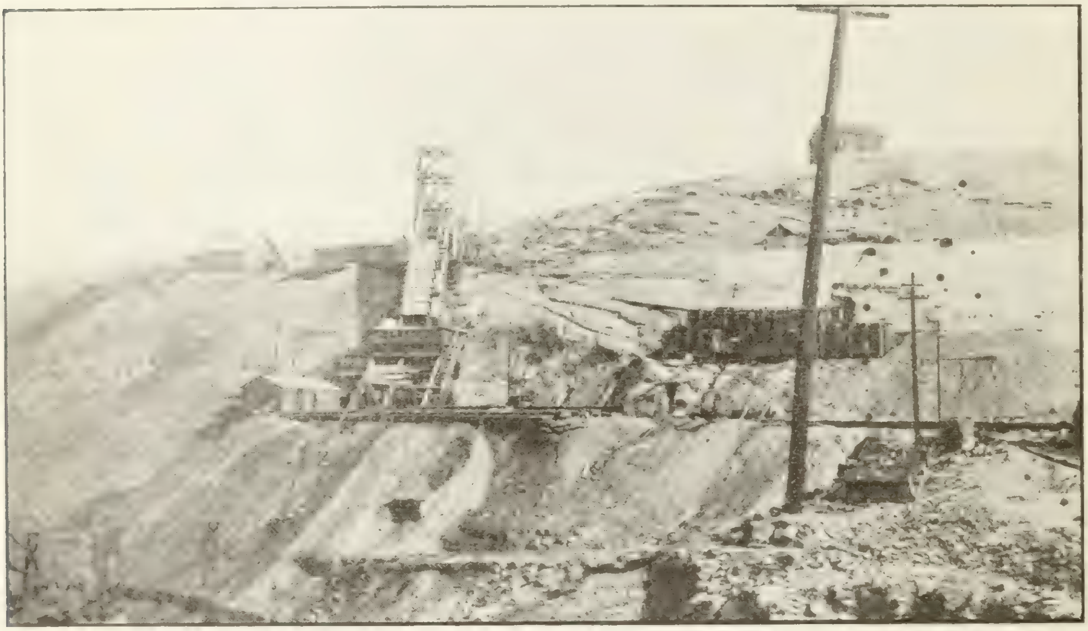
Twelve men are employed. Nassau Copper Company, 339 Bush street, San Francisco, Cal., owner.

Penn Copper Mine. Situated 4½ miles northwest of Valley Springs, the terminus of the Southern Pacific Railroad, and on the western copper belt of Calaveras County. This property consists of four patented mining claims: Campo Seco, Hecla, Satellite, and Little Satellite, comprising 76 acres, also 2200 acres of patented agricultural land, giving 5280 feet on the lode. The veins have a course of N. 30° W. with a dip of 65° NE. The vein matter is composed of quartz, talcose schists and clay. The ores are in the form of copper iron sulphide (chalcopyrite) associated with pyrite and carry a small percentage of gold, silver and zinc.

The general average of ore smelted is as follows: Copper, 5%; gold, $1.10; silver, $1.20; zinc, 5%; iron, 23%.

Two veins have been developed; east vein has an average width of 50 feet. The ore shoot on east vein is 900 feet long with an average width of 15 feet, and a shoot of ore worked on west vein was 1000 feet long, with an average width of 25 feet.

Ore shoots occur in the form of lens-shaped deposits in the schist. The veins have a hard greenstone on both walls. The east and west veins are about 300 feet apart and have the same general course, running in a southerly direction; the ore shoots dip eastward with the veins and also towards the north. The developments on the property consist of five shafts and several tunnels, three shafts on the east vein, and two on west vein. Operations are carried on through No. 3 shaft, which has been sunk on a 74° incline to a depth of 1465 feet on the east vein, and a winze north of shaft with a depth of 465 feet on the vein.

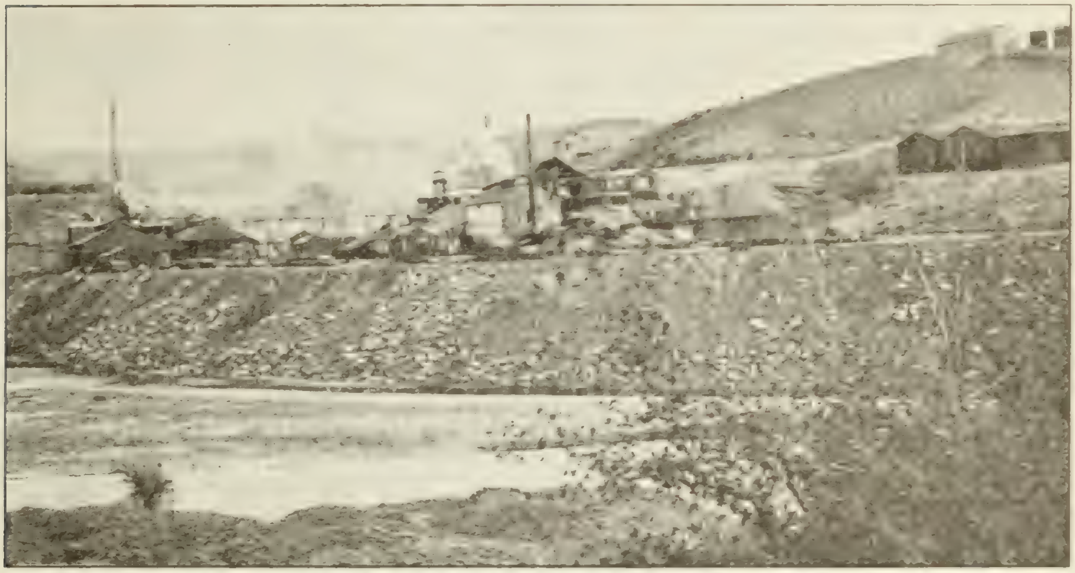


Campo Seco smelter of Penn Mining Company, Campo Seco, Calaveras County, California, showing No. 3 shaft and leaching tanks.

There are eleven levels 150 feet apart, with drifts north and south on the vein. No. 2 shaft on west vein has been sunk to a depth of 750 feet, having nine levels 100 feet apart, with drifts both north and south on the vein. Shaft No. 3 is about 1300 feet north of shaft No. 2. The total amount of underground workings is 29,045 feet.

Campo Seco smelter of Penn Mining Company, Campo Seco, Calaveras County, California, showing crushing plant, bedding bins and roasters.

Reduction plant: The ore is hauled from mine bins in 5-ton cars by 25-ton locomotive to crushing plant, where the ore is crushed by No. 3 type D Gates gyratory crusher to 1½-inch size; crushed product is elevated to 18″x72″ trommel and screened to ⅝-inch size, oversize from trommel to 24″x36″ McFarland rolls, fines conveyed to bedding bins having a capacity of 2100 tons. Product from rolls elevated to 18″x24″ trommel, screened to ⅝-inch size, the oversize to 12″x24″ rolls, rescreened and fines conveyed to bedding bins by 12-inch Robins belt conveyor. The ore is trammed from bedding bins to 8 McDougall roasting furnaces, capacity being 140 tons per twenty-four hours. The calcines are trammed from McDougall roasters in 1½-ton cars to two (23′x66′) reverberatory furnaces having a smelting capacity of 150 tons. Waste heat from the reverberatory furnaces used in a Sterling waste heat boiler, generating 175 h.p. which is used in running power plant and 1500 cubic-foot Nordberg compressor. One water-jacket blast furnace (36″x72″) having a capacity of 100 tons. Total smelting capacity of plant is 250 tons. The blast furnace charge on 5% to 7% copper ore is as follows:



Campo Seco smelter of Penn Mining Company, Campo Seco, Calaveras County, California, showing blast furnace, reverberatory furnaces and McDougall roasting furnace plants.

	Pounds.
Ore	1,100
Lime	225
Slag	200
Coke	85

The ore for the reverberatory furnaces is self-fluxing. A high grade matte of 50% to 60% is the final product of smelting operations. Crude oil is used as fuel for the boilers, reverberatory furnaces and the locomotives which haul the ore from the mines to the smelter.

Electricity is generated at the mine and is used for lighting and also for motive power for electric locomotives in the yard for hauling slag pots, etc. About 43 gallons of oil are used per ton of ore smelted. The total consumption of oil amounts to 7700 gallons per 24 hours.

Water supply for plant is pumped from the Mokelumne River by 6″ x 8″ Dean triplex pump through 1500 feet of 4-inch pipe line to storage tanks having a capacity of 60,000 gallons.

The matte is crushed to 1-inch size, sacked and shipped to American Metal Company, of New York City. The company also owns a limestone quarry northeast of Valley Springs. Between 150 and 200 men are employed on this property. Penn Mining Company, 1713 Harris Trust Building, Chicago, Ill., owner. A. P. Busey, general manager; D. C. Smith, superintendent.

Quail Hill Copper Mine. Situated in the Gopher Range, on west copper belt, about 8 miles west of Copperopolis—shaft 150 feet deep. Idle. Jasper McDonald Estate, San Francisco, owner.

Star and Excelsior Mine (copper). It is 7 miles southwest of Copperopolis, adjoining the Napoleon mine on the southeast. The vein is capped by heavy iron gossan from 50 to 100 feet in width. The ores are sulphides and carbonates with gold and silver values. The Star shaft has a depth of 100 feet, the Excelsior tunnel is 180 feet long. Two men are employed. Wm. Nuner, of San Andreas, owner.

Union Copper Mine. Located at the town of Copperopolis, 14 miles southeast of Milton, the terminus of the Southern Pacific Railroad. The property of the Calaveras Copper Company, it comprises three patented claims; Keystone, Union and Empire, giving 8000 feet on the lode, including patented agricultural land comprising a total of 2386 acres. The vein in these claims shows a maximum width of 40 feet, with an average width of 15 feet. The ores are massive sulphides of copper (chalcopyrite) associated with pyrite in a belt of black slates and carry no gold and silver values. The oxide zone extends only to a depth of 30 feet below surface at which point the unaltered sulphide zone is encountered, and there is apparently no zone of secondary enrichment.

Three ore bodies have been developed and worked through the Union shaft to depth of 850 feet; Empire shaft, 280 feet; Keystone shaft, 400 feet; and North Keystone shaft, 300 feet. Ore shoots dip eastward with the vein, also towards the north. The south Union shoot is 300 feet long with an average width of 15 feet. The north Union shoot is 200 feet in length and has an average width of 10 feet. The ore shoot on Keystone shows a length of 100 feet with an average width of 15 feet. The general course of vein is N. 38° W. with a dip of 60° NE.

Ore has been developed on nine levels, and there are 400 feet of drifts, stopes and shafts which are connected.

All operations have been carried on through the Union shaft, but in the future the new Keystone shaft, which has a new steam hoist with a steel gallows frame and steel ore bins will be used as the main working shaft. The property has a record of having shipped 125,739 tons of ore assaying 10% copper from 1861 to 1869.

The amount of copper produced and sold during 1913 was 1,051,659 pounds.

Mine equipment: At the Union shaft is a double steam hoist driven by 150 h.p. electric motor and a 600 cubic foot air compressor. At the Keystone shaft there is a double-drum steam hoist and a 1500 cubic foot Nordberg compressor, which is driven by 275 h.p. electric motor.

The ore is trammed from Union shaft to a 300-ton concentrating mill, a distance of 4000 feet by 25 h.p. electric motor, hauling four five-ton cars, and dumped into mill bins having a capacity of 600 tons. The mill having proven unsuccessful, will be reconstructed. Tests are being made on oil flotation for recovery of the sulphides.

Smelter: A 300-ton sampling works, 40″ x 120″ waterjacket blast furnace, having a capacity of 125 tons. One reverberatory furnace of 150 tons capacity. Two McDougall roasting furnaces (16 feet in diameter) capacity 40 tons each. A 350 h.p. Sterling waste heat boiler. A 1500 cubic foot Nordberg compressor furnishes air for blast and reverberatory furnaces. The storage capacity of bins for blast and reverberatory furnaces is about 1000 tons.

Cost of supplies and freight—	
On ores from Copperopolis to Milton	$4 00 per ton
On ores from Milton to Selby smelter	1 25 per ton
On ores from Milton to Kennett	2 75 per ton
Treatment charge	3 00 per ton
Lime (mining and hauling)	2 00 per ton
Coke (haulage and freight)	18 00 per ton
Oil	1 00 per ton
Silica (delivered)	1 75 per ton

Electric power is furnished by Sierra and San Francisco Power Company at a cost of $4.50 per horsepower.

The property is at present shut down on account of financial difficulties. With closer transportation facilities this property has a big future as a copper producer.

Thirty men are employed in development work and leaching operations. Calaveras Copper Company, president, Chas. M. Hayden; secretary, Herbert Goff, 87 Ames Building, Boston, Mass., owners. Joseph Hadley of Copperopolis, manager.

Welch and Star Mines (copper). Located 3 miles southeast of Copperopolis on ridge east of Black Creek. The vein is covered by a heavy iron gossan capping carrying both gold and silver values. Ore bodies occur in lens-shaped masses in a schist formation, having a width of from 12 feet to 20 feet.

Developments consist of a shaft 150 feet deep and a 250-foot crosscut tunnel connecting with shaft at 90 foot level. Idle. Peyton Chemical Company, Mills Building, San Francisco, owner.

GOLD.

Geology of East Belt.

The mines, which are found from 6 to 18 miles east of the Mother Lode, occur in the slates of the Calaveras formation and in granodiorite. Cutting the granodiorite are numerous small diorite dikes, which usually cut the veins, showing that they were formed at a later period. The mines in the neighborhood of Glencoe are in the Calaveras formation and those in the West Point district in granodiorite. The veins in the neighborhood of Glencoe generally have an east and west strike and dip to the north. The strike and dip of the veins in the granite are not at all uniform. Sometimes the vein in depth will have an opposite dip from that which it has near the surface. Veins occur along lines of fissuring, which fissures are filled with altered granite and vein quartz. Where the walls of the fissure are 2 to 4 feet apart short rich shoots of ore are formed. For instance, a wedge of quartz forming on footwall will gradually widen out to 2 or 3 feet when it leaves the footwall and will cross the fissure at a low angle and join the hanging-wall where it will pinch. Between the short shoot of ore thus formed and its parting from the footwall, there will be several stringers of quartz, more or less parallel to the foot, while along the footwall a second wedge-shaped vein of quartz will form and repeat the peculiarities of the shoot described. The footwall of these veins is usually well defined, while the zone of fracturing and crushing will extend various distances into the hanging-wall.

Mining districts.

Mountain Ranch Mining District. There is very little activity in quartz or placer mining in the neighborhood of Mountain Ranch. The formation of this district is mica schist and quartzite, veins of quartz being usually intimately associated with porphyry dikes on one wall or the other.

Railroad Flat Mining District. The veins in the Railroad Flat district lie in the mica schist of the Calaveras formation, having a usual strike of northwest and southeast and a dip of 65° NE. The only property under active operation in this district is the Comet mine. In the past there has been quite extensive operations in hydraulic and drift mining on auriferous gravel deposits.

Sheep Ranch and Esmeralda Districts. Veins in these districts usually lie in the dark siliceous slates, in Sheep Ranch district having a general course of northwest and southeast, dipping to northeast. In Esmeralda district the veins have general east and west course and dip to the north.

Vallecito and Douglas Flat Mining Districts. In the mining districts of Vallecito and Douglas Flat outside of a small amount of prospecting there is no activity in placer or quartz mining, the former on account of a shortage of water. Veins in this district occur on contact of granodiorite and slate, or in the granodiorite.

General Geology of the Mother Lode Belt.

The chief interest in mining centers around the Mother Lode belt, which enters the county from the south at Robinson's Ferry, on the Stanislaus River, and leaves it at Middle Bar on the Mokelumne River. The general trend of the Mother Lode belt is northwesterly and southeasterly. This belt, which has been termed the Central Belt of the Mother Lode system of veins, can be distinctly traced by the large quartz croppings at different points along the lode, which are especially noticeable on Carson Hill, Chaparral Hill, also at Angels near the Gold Cliff mine, north of San Andreas at the Gottschalk mine, finally at the Hamby mine four miles southwest of Mokelumne Hill.

On the south slope of Carson Hill there are three distinct veins all more or less curved, which lie chiefly in the fissile amphibolite schists.

The ore bodies of the different mines on Carson Hill, such as Melones, South Carolina, Finnigan, and Morgan, are in the form of a stringer lead, consisting of a broad zone of amphibolite schists heavily impregnated with pyrite and intersected by numerous quartz stringers and veins. This vein is accompanied by a heavy vein of low grade white quartz usually on the hanging-wall side. The general course of these veins is northwest and southeast, with a dip of 50° to 80° NE. The ores are free milling, carrying some galena, and tellurides of gold and silver.

On Chaparral Hill these veins converge in the form of a large outcropping of quartz, the ore bodies being similar in character to those of the Carson Hill district. While in the neighborhood of Angels Camp the Mother Lode system is represented by numerous important veins which fall into two groups, the group of veins around Angels Camp and Altaville, which are in the amphibolite schists, and the group of veins a mile west of this town chiefly in the dark slates belonging to the Calaveras formation. In the former group are located the Gold Cliff, Madison, Etna King, Utica, Lightner, Angels, and Bovee mines.

The ore bodies of these properties are in the form of stringer leads consisting of numerous quartz stringers and veins cutting through the amphibolite schists, which are heavily impregnated with pyrite.

At the Gold Cliff mine the ore body has a working hanging-wall of heavy low grade white quartz, 6 to 10 feet in thickness. In the Angels, Lightner, and Utica mines there is a zone of talc 20 to 100 feet in thickness, with a dip of 30° E., which cut off the ore in the Angels mine between 100 and 200-foot levels, in the Lightner mine between 500 and 600-levels, also in the Utica property at the Stickles shaft at the 1000-foot level, and in the Cross shaft between 1300 and 1400-foot levels. Recent developments have shown that the ore continues under this zone of talc, being slightly faulted, and the ore body having straightened up to a dip of 80°.

General Geology of the West Lode.

This gold belt extends through Salt Spring Valley from the Alta Mine, located 8 miles southeast of Copperopolis on Stanislaus River, in a northwesterly direction as far as the neighborhood of Valley Springs. The valley lies between Gopher Ridge on the west and Bear Mountains on the east. The formation of the valley consists of foliated black slates of the Mariposa formation, diabase, amphibolite schist and serpentine. The gold-bearing veins usually occurring in the amphibolite schist and black slates.

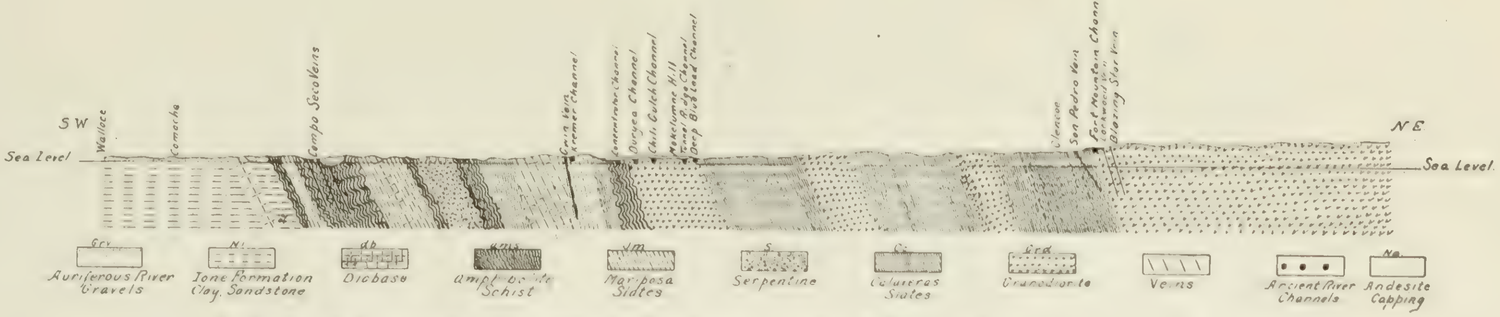
The veins have a general northwesterly and southeasterly strike with a dip to the northeast, usually flat. The gold-bearing quartz is as a rule associated with dikes, finely granular and light gray in color.

GOLD MINES—QUARTZ.

The Adelaide Mine (quartz). It is located on south slope of Carson Hill, ¼ of a mile east of Robinson Ferry. The workings at this property are on a vein east of the main fissure with a strike of N. 30° W. and dip of 80° E. The ore body between the walls shows a width of 15 feet of talc schists, cut by three distinct quartz veins, the footwall of the vein is greenstone with a hanging-wall of black talcose slate. Mine was opened up by vertical shaft 110 feet deep. Last time the property was under operation was in 1890. B. F. Wood et al., of Melones, owners.

Ætna Mine (quartz). It is 2 miles north of Glencoe, on ridge south of South Fork of Mokelumne River. In granodiorite formation. Workings carried on through two tunnels. Lower tunnel 160 feet on vein. Upper tunnel 250 feet long. East and west vein, dip 75° S. Two men employed. G. A. MacKisson, of Rich Gulch, owner.

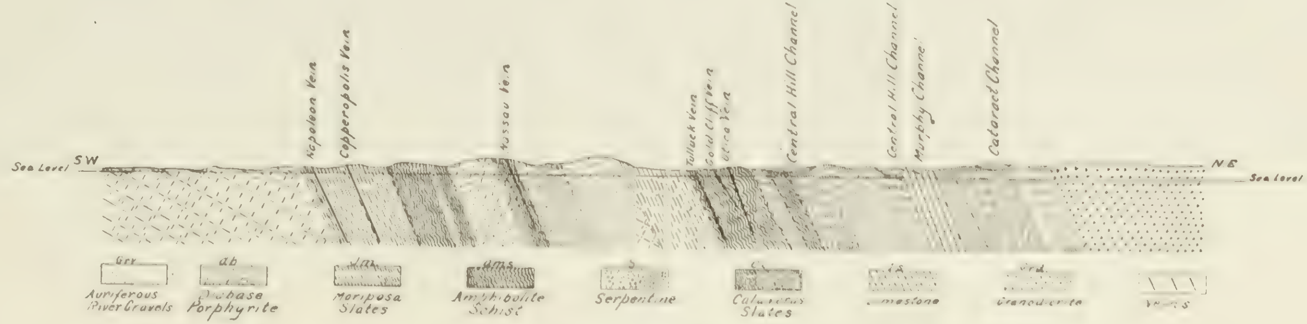
To accompany report
on Calaveras County



Structural Section of Calaveras County through Wallace Campo Seco, Gwin Mine, Mokelumne Hill, Glencoe, and Lockwood Mine

0 1 2 3 4 5 6 Miles

Scale 1/63000



Structural Cross-Section of Calaveras County through Copperopolis, Angels and Murphys

0 1 2 3 4 5 6 Miles

Scale 1/63000

Afterthought Mine (quartz). Located at Railroad Flat, on ridge north of Little Spruce Creek. Incline shaft 140 feet in depth, tunnel 300 feet long. Idle. Aaron Cook Estate, of Mokelumne Hill, owner.

Alexander Mine (quartz). It is 3 miles south of Glencoe, on ridge north of the North Fork of Mokelumne River. Tunnel 870 feet long, shaft 50 feet deep. Idle. W. P. Craig, care of H. S. Crocker Company, 565 Market street, San Francisco, owner.

Alpha and Omega (*Greek*) *Mine* (quartz). It is 3 miles north of Mountain Ranch, on ridge between Jesus Maria and Esperanza creeks. Shaft 175 feet deep. Property being reopened. There is a 5-stamp mill on property. Two men employed retimbering shaft. J. B. Medina, C. F. Bennett, of Mokelumne Hill, owners.

Alpine Mine (quartz). Three miles southwest of Mountain Ranch. Two tunnels on vein, 90 and 150 feet in length. Mrs. Mary Swank, of Mountain Ranch, owner.

Alta Mine (quartz). Situated 8 miles southwest of Copperopolis, on ridge northwest of the Stanislaus River. The formation consists of a broad zone of black mineralized slate cut by numerous quartz stringers, which was extensively mined as shown by two large open cuts. This ore zone is from 20 to 100 feet in width. Vertical shaft 387 feet deep, and on the 287-foot level there is a drift 300 feet north and 600 feet south, through which the ore from the two open cuts was extracted. Equipment consists of 8 h.p. boiler, double-drum steam hoist, 8-inch Cornish pump, 12″x18″ Laidlaw-Dunn-Gordon compressor driven by 75 h.p. motor.

Mill: No. 3 Gates gyratory crusher, 40-stamp mill, 950-pound stamps, 8 Standard concentrating tables, driven by 100 h.p. motor. Idle. California-Calaveras Mining Company, E. L. Flower, Milton, agent.

American Eagle Mine (quartz). It is 4 miles southwest of Railroad Flat, on ridge west of Nelson Gulch. Strike of vein east and west, dip 65° N. Average width of vein 12 inches. Vein developed by three crosscut tunnels, 500, 80 and 150 feet in length and drifted on east and west. Two-stamp mill on property. Three men employed. Allen W. Doe, of Railroad Flat, owner.

Angels Mine (quartz). See our Reports XIII, p. 141; X, p. 150; XII, p. 89 M and S. P., Nov. 26, 1904.

It is located on Angels Hill in townsite of Angels Camp. Consists of six patented claims and one placer claim: Billings, Crystal, Oneida, Dr. Hill, McCormick, Angels, and Beda Blood placer claim, a total of 101.15 acres. Property is operated through a three-compartment shaft 850 feet deep. There is also the Crystal shaft, 600 feet deep, which is used for lowering timbers. Two veins have been developed on this property called the East and West veins with a strike of northwest and southeast, East vein having a dip of 80° NE. and West vein of 65° NE. These veins have an average width of 20 feet, with a diorite footwall and heavy talcose slate hanging-wall. Ore is hoisted by double-drum electric hoist, and dumped into storage bins in 60-foot gallows frame, passing over grizzly to 10″x20″ Blake crusher. Mining operations are carried on with air drills, air being supplied by a 12-drill Angels Iron Works compressor. Hoist, compressor and rock breaker are driven by 225 h.p. Westinghouse motor. Ore trammed from storage bins at shaft to mill up a 30° incline.

Mill: 40 stamps, weighing 850 pounds each, dropping 7 inches, 104 drops per minute, crushing 5 tons per stamp through No. 1 punched screen. Battery pulp concentrated on sixteen 4-foot Frue vanners. An extraction of 90% is made in mill, the loss in the tailings being $0.20 per ton. Value of concentrates $50 per ton. Concentrates are shipped to Selby Smelting Works, concentrates running under $50 per ton have a freight rate from mine to smelter of $3.25 per ton; concentrates valued at over $50 per ton have a freight rate of $4.25 per ton. Total operating costs are $2.25 per ton. Lumber costs $18 per 1000 feet; round timbers costing $2.15 per stick. Power from Pacific Gas and Electric Company at $4.50 per horsepower. Seventy men are employed. Angels Quartz Mining Company, James V. Coleman, of San Francisco, owner. A. M. Randol, general manager.

Ariel Mine (quartz). Located 2 miles northeast of Mokelumne Hill, on ridge south of Mokelumne River. Series of parallel north and south and east and west veins on property. Work carried on through 600-foot crosscut tunnel. Idle. A. H. McCarty, Harry Schrag, of Mokelumne Hill, owners.

Arthur (*French*) *Mine* (quartz). A prospect 4 miles east of West Point, on ridge west of Bald Mountain. Shaft 70 feet deep. Idle. Mrs. Sarah Gallagher, of West Point, owner.

Bachman Mine (quartz). Situated 7 miles south of San Andreas, on the Angels and San Andreas road. Two veins on property, one running northwest and southeast, the other east and west, converging to the northward. Shaft, 478 feet deep, sunk on a 65° incline on east and west vein. Shaft 75 feet deep on northwest and southeast vein, which is 25 to 100 feet wide. Idle. Constant Bund, of Fourth Crossing, owner.

Banner (*Grasshopper*) *Mine* (quartz). At Glencoe. Shaft 120 feet deep, caved. Width of vein, 2 feet. Strike east and west, dip 45° N. Idle. Judge Ira Reed, of San Andreas, owner.

Bartola Mine (quartz). It is 2 miles east of West Point, on ridge west of Bear Creek. Shaft 135 feet deep. Idle. John Hansen, of West Point, owner.

Basco Mine (quartz). At Esmeralda, on ridge north of San Antonio Creek. Shaft on vein 100 feet deep and tunnel 200 feet in length. Idle. John Redick, Frank Solinsky et al., Monadnock Building, San Francisco, owners.

Beatrice Mine (quartz). It is 1 mile west of Murphy, on Murphy Ridge between Murphy and San Domingo creeks. Controls five claims: Beatrice, Extension, Roble, Roble Annex, Beatrice Annex. The strike of vein is east and west, dip 70° N. In mica schist formation, Roble shaft 350 feet deep. Beatrice shaft 150 feet deep. Crosscut tunnel 1200 feet long connects with Roble shaft. Idle. C. L. LeTourneau et al., Portland, Ore., owners.

Big Four Mine (quartz). It is 5 miles south of San Andreas and joins the Thorp mine on the north. Idle. Constant Bund, owner.

Big Horn Mine (quartz). (See Report XIII, page 97.) It is 5 miles north of Murphy, on ridge north of San Domingo Creek. Two tunnels on vein, upper 400 feet long, lower 420 feet long, winze on vein in lower tunnel 50 feet deep, giving a total depth of 175 feet from surface. Idle. W. C. Frances, of Portland, Ore., owner.

Big Spring Mine (quartz). (Graam.) It is 1½ miles south of Angels. General course of vein is northwest and southeast, dipping 50° NE. Vein 10 to 100 feet in thickness. Shaft sunk on the vein 100 feet deep. Idle. Norman Smith, C. D. Smith et al., of Angels, owners.

Billy Williams Mine (quartz). It is 3 miles northeast of West Point, on ridge southeast of Skull Flat Gulch. Crosscut tunnel for 200 feet to vein, and drift south on vein for 200 feet. Two men employed. Thomas Jenkins, of West Point, owner.

Black Wonder Mine (quartz). Located 9 miles southeast of West Point, on ridge northeast of Licking Fork of Mokelumne River. Formation black siliceous slate. Course of vein N. 30° W., dip 65° W. The quartz is very heavy sulphretted, containing arsenopyrite, chalcopyrite, marcasite, galena and zincblende. Developments consist of a tunnel 800 feet on vein and a shaft 65 feet deep. Idle. Fred Greeve, of West Point, owner.

Blair Mine (quartz). It is 1¼ miles west of Angels. Shaft 450 feet deep, sunk on the vein, and has been developed for a distance of 150 feet on 150′, 200′ and 400′ levels. Vein strikes northwest and southeast and dips 55° NE., having a width of 12′ to 20′ of ore. Equipment consists of 60 h.p. horizontal boiler, 25 h.p. single-drum hoist, 2-drill Rand compressor.

Mill: Ten stamps, 950 pounds per stamp, 9″ x 12″ Blake crusher. Idle. M. A. Dolano, of Palo Alto, F. Solinsky, of San Francisco, owners.

Blazing Star Mine (quartz). Situated 1½ miles east of West Point, adjoining the Water Lily mine on north. Vein has an average width of 2 feet, strike N. 30° W., dip 80° W. Shaft sunk on vein to a depth of 400 feet. Mine was worked from three levels; on 210-foot level, drift 200′ N. and 200′ S.; on 260-foot level, drift 300′ N. and 150′ S.; on 360-foot level, drift 130′ N. On 260-foot level north at a distance of 150 feet from shaft, a winze was sunk 50′ encountering an orebody 450 feet long with an average width of 3 feet. Vein cut by a series of diorite dikes. Property being reopened. Union Development Company, 713 Iowa Loan and Trust Building, Des Moines, Iowa. W. O. Pray, superintendent.

Blue Bell Mine (quartz). Located 2 miles northeast of Glencoe, on ridge south of the South Fork of Mokelumne River. Claims: Blue Bell, Blue Bell Extension, Crown Point, and Crown Point Extension. Vein on contact of granodiorite and slate, the former being the hanging-wall, the latter the footwall. Width of vein 3 feet, strike N. 20° E., dip 30° E. Work carried on through two tunnels. Elevation of lower tunnel 1700 feet, 600 feet long with 540 feet of drifts and crosscuts. Elevation of upper tunnel 1900 feet, 100 feet in length. Idle. Copa de Oro Mining Company, owners. W. D. Stewart, president and secretary, Garden City Bank, San Jose.

Blue Jay Mine (quartz). Four miles southeast of Mokelumne Hill, on the North Fork of the Calaveras River. Two claims, Blue Jay and Franklin. The course of vein is N. 20° W., with a dip of 45° E. Ore milled from two shafts sunk on outcrop of vein to a depth of 125 feet. A crosscut tunnel 1400 feet in length was driven for the vein but failed to develop any ore. There is a 10-stamp mill on property. Idle. Hesperus Mining and Mining Company, 34½ Beacon street, Boston, Mass., owners.

Bolytho Mine (quartz). (See Report XII, page 93.) This mine is 1 mile south of Angels. Controls 180 acres and includes the Bolytho quartz claim and Figaro Homestead, containing 160 acres. Two shafts on vein to depths of 300 feet and 200 feet. This vein is called the Dead Horse lead, contains a broad zone of amphibolite schist cut by numerous quartz stringers. Ore is free milling, carrying from 2 to 5% pyrite. General strike of vein is northwest and southeast, dipping 60° NE. Idle. Has not been worked for some years. Bolytho Mining Company, of Pittsburg, Pa., owners. E. P. Lynch, president.

Bon Ton Mine (quartz). It is 5 miles north of Murphy, on ridge between San Antonio and Indian creeks. Tunnel 130 feet long. Idle. W. H. Sellsby, C. A. Whitney Estate, of San Francisco, owners.

Boston (*Esperanza*) *Mine* (quartz). (See Report XII, page 90.) It is on Indian Creek, 2 miles northeast of Mokelumne Hill. There is an inclined shaft 340 feet deep on property. The mineral zone exposed by the drifts is from 40 to 50 feet wide, consisting of veins, stringers, and large irregular masses of quartz in chlorite and talcose schists. There is a 30-stamp mill on the property. Idle. M. Davidson, of Mokelumne Hill, owner.

Bowden Mine (quartz). It is 6 miles northwest of El Dorado, on ridge west of Salamanda Gulch. Tunnel 150 feet long on vein 5 feet wide. Two men employed driving tunnel. Thomas Bowden, A. Scossa, of El Dorado, owners.

Bright Star Mine (quartz). It is located three miles northwest of San Andreas. The vein has a strike of northwest and southeast with a dip of 70° NE., and occurs in black clay slates. There is a tunnel 200 feet in length driven on the vein. Two men employed. Thomas Jackson, of North Branch, C. Gorgadumie, of Oakland, owners.

Bruce Mine (quartz). It is at Esmeralda, on Indian Creek. Tunnel on vein 400 feet in length. Idle. M. Lengen, L. Gagnon, of Esmeralda, owners.

The Bruner Mine (quartz). (See Reports X, XI, XII.) It is 2 miles south of Angels. Developments consist of shaft 200 feet deep, with levels at 60 and 80 feet and a crosscut to east at 150-foot level, 125 feet in length. Controls eight claims, Apex, Evening Star, Dewett, Spring Gulch, Cold Hill, Romaggi & Costa, Bald Hill, New Discovery. Idle. Overall-Stickle Mining Company, owners. President, Geo. E. Stickle; secretary, G. A. Posey; office, 847 Monadnock Building, San Francisco.

Buena Vista Mine (quartz). It is 1¼ miles west of Copperopolis. The vein has an average width of 10 feet, with a strike N. 10° W. and a dip of 55° W., in amphibolite schist. Developments consist of an incline shaft 185 feet in depth. A tunnel 400 feet long has been driven on vein which connects with shaft on the 90-foot level. Two men employed. Frank Tower, Mrs. A. R. Bowland, of Copperopolis, owners.

Buena Vista (*Josephine*) *group of mines* (quartz). They are 3 miles west of West Point, on ridge north of the Middle Fork of Mokelumne River. Crosscut tunnel 150 feet to vein. Tunnel on vein 500 feet in length. Five-stamp mill on property. Four men employed driving east tunnel. V. P. Yeluini, of West Point, E. Peabody and P. M. Boston, 1973 Ninetieth avenue, Elmhurst, owners. E. Peabody, superintendent.

Bullion Mine (quartz). It is 2 miles south of Angels, on Albany Flat. Developments consist of a shaft 200 feet deep and levels north and south on the vein at 100 and 200 feet. Vein a westerly splitoff of the main Mother Lode vein. Frank Pattee, L. L. Doak, of Oakdale, owners.

Bullion Mine (quartz). It is 4 miles north of Murphy, on ridge north of Indian Creek. Vein 12 inches wide in mica schists, strike N. 65° E., dip 80° S. Shaft 60 feet deep. Tunnel 200 feet long. Steve Valente, Paul Lefler, of Calaveras, owners.

The Calaveras Consolidated Mines (quartz). (See Reports X, p. 56; XI, p. 169.) This group of mines is located 7 miles south of Angels, extending from the Stanislaus River up the south slope of Carson Hill, and consists of the following claims: Extension, Relief, Stevens, Brown, Santa Cruz, Mexican, Ivanhoe, Calaveras. All patented and having an area of 140 acres. The workings of this mine consist of a tunnel 1400 feet in length and a shaft 600 feet deep. Strike of vein is northwest and southeast, dipping 65° NE., with an average width of 20 feet of vein material. Mouth of tunnel and shaft caved. All mill and mine machinery have been dismantled and sold. Property being reopened. Eight men employed. Brown, of Napa City, and Newcombe, of San Francisco, owners.

California Mine (quartz). It is 6 miles west of Sheep Ranch, on ridge north of O'Neils Creek. Shaft on vein 80 feet deep and tunnel 96 feet long. Idle. E. Peabody, of West Point, owner.

California-Ophir Mine (quartz). Located in the townsite of Carson Hill, consists of one patented claim, California-Ophir. Vein has a width of 5 feet with a footwall of diabase and hanging-wall of gray slate. Shaft on the property is sunk on 65° incline to depth of 600 feet, the vein opened up on three levels, 200, 400 and 600 feet, and drifted on both north and south for a distance of 400 feet. Property has been idle since 1903. John Raggio, of Stockton, Frank Solinsky, of San Francisco, owners.

Carlton Mine (quartz). It is 2 miles west of West Point, on ridge north of the Middle Fork of the Mokelumne River. Shaft 160 feet deep. Idle. T. Carlton, of West Point, owner.

Caruthers Mine (quartz). It is 4 miles north of Murphy, on ridge south of Indian Creek. Shaft 200 feet deep. Tunnel 200 feet long, connecting with shaft at 200-foot level. Idle. Deserey Frecot, of Sheep Ranch, owner.

Champion Mine (quartz). (See Report XII, page 91.) It is 1½ miles west of West Point, on ridge north of Middle Fork of Mokelumne River. Shaft 900 feet deep, caved. Idle. Mrs. M. Rieffino, of San Francisco, owner.

The Chaparral Hill Group of Mines (quartz). This group of mines is located on Chaparral Hill, 3 miles south of Angels, and consists of five patented claims: Felicie, Chaparral Hill, Rothschild, Vanderbilt, and Bright Star, comprising 80 acres of ground. The footwall of vein is a massive outcrop of heavy white quartz from 22 to 130 feet in thickness, the main ore body consisting of a mass of quartz stringers cutting through a zone of amphibolite schists which are heavily mineralized, containing from 1 to 2 per cent pyrites, also shows some tellurides of gold and silver and arsenopyrite. Most of the work on this ore body has been in surface prospecting. A series of crosscut tunnels has been driven through the ore body. On the Vanderbilt claim there is a tunnel 500 feet long, mostly on the vein. On Chaparral Hill claim there is a 464-foot crosscut tunnel, cutting diagonally across the formation. On the other claims a series of prospect shafts has been sunk along the vein to depths of 50 to 150 feet. Four men are employed in driving tunnel. M. C. Meeker, of Camp Meeker, Sonoma County, owner. F. I. Stevenot, superintendent.

Cherokee Mine (quartz). It is 1 mile northwest of Altaville. Controls 122.6 acres. Idle. B. R. Prince Estate, of Altaville, owners.

Collier Mine (quartz). It is 6 miles east of Murphy. There are 6 tunnels on a vein of dark quartz, containing free gold, pyrite and a little galena. Vein strikes east and west, dip 80° N. The country rock is a hard siliceous slate. Six tunnels, 225, 160, 275, 190, 400, 412 and 300 feet in lengths. The ore is very base in character, containing galena, zinc blende, pyrite, arsenical pyrites, antimony and tellurides of gold and silver. Property has 5-stamp mill, where an attempt was made to mill the ore with poor results. Idle. J. H. Condit, of San Francisco, Mrs. P. A. Malaspina, of Murphy, owners. P. E. Condit, of Murphy, agent.

Columbo Mine (quartz). It is 2½ miles south of Angels. Two shafts have been sunk on vein to a depth of 60 feet. Two men employed sinking shaft. John Ferrari, of Angels, owner.

Columbus Mine (quartz). Three miles northwest of West Point, on ridge southeast of the North Fork of Mokelumne River. Crosscut tunnel 150 feet in length. Shaft 150 feet in depth. Shaft caved. Idle. P. A. McKenzie, of Oakland, owner.

Comet Mine (quartz). It is 2 miles north of San Andreas. A large open cut was excavated here and two crosscut tunnels 300 feet long run to the open cut from the east. Idle. I. H. Reed, of San Andreas, owner.

Comet Mine (quartz). Situated 2 miles north of Railroad Flat, on the South Fork of the Mokelumne River. The formation is a mica schist. Vein has an average width of 18 inches, strike N. 55° E., dip 75° NW. Diabase dike having a course of N. 70° E., dip 65° SW. cuts vein, at intervals being closely associated with the quartz in the fissure. The vein pinches and swells, ore forming in kidneys. The character of the quartz is ribbon rock with 2% pyrite and galena.

Fracturing extends some distance into the walls, making them very irregular. The dike does not appear to cause any enrichment in the vein and appears to be of later origin. Work is carried on through two crosscut tunnels. Lower tunnel 210 feet to vein with a drift 250 feet southwest and one 40 feet northeast. Upper tunnel 96 feet above lower tunnel. Crosscut 96 feet to vein and drift 50 feet northeast and 50 feet southwest. Water supply taken from the Licking Fork of Mokelumne River through 2 miles of ditch and 1400 feet of 10-inch pipe line, giving an available head of 465 feet which runs mill.

Mill: 10″x20″ Blake crusher, 10 stamps, weighing 950 pounds, dropping 98 per minute, 6-inch drop, crushing 1½ tons per stamp through 40-mesh screen. Concentrates saved by 2 Deister sand tables. An extraction of 80% is made. Cost of mining $2.60, milling $1.65, cost of transportation of sulphurets to Selbys $13.50. Fourteen men are employed. F. L. Harrington, of Railroad Flat, owner.

Cornmeal (*Camille*) *Mine* (quartz). A prospect 4 miles south of West Point. An east and west vein, dip 80° N. Crosscut tunnel 100 feet to vein, drift west 200 feet. Idle. D. Fillippini, A. McAllister, of West Point, owners.

Cosgrove Mine (quartz). It is at Angels, only a prospect. Mrs. Kate Cosgrove, of Stockton, owner.

Crossette Mine (quartz). It is 4 miles west of Angels. Controls 40 acres. Vertical shaft 80 feet deep on property. Vein is 18 inches wide and has a strike of northwest and southeast, dipping 40° E. Equipment consists of 35 h.p. upright boiler and a single-drum steam hoist. The property is being developed. Four men are employed. Robert S. Crossette, Ella Bur, of San Andreas, owners. Don Mackey, superintendent.

Crown Point Mine (quartz). Two miles west of Murphy, on Murphy to Angels road. Series of blanket veins striking northwest and southeast, dip 18° NE. Very rich pockets have been taken out, these pockets occurring on contact of vein with a porphyry dike. Tunnel 225 feet long. Eight men employed. Steven Carley, E. A. Black, of Murphy, owners.

Deerfoot (*Gilbertson*) *Mine* (quartz). Located 1½ miles north of West Point on ridge north of Mott's Gulch. Width of vein 12 inches, strike N. 30° W., dip 70° NE. Tunnel on vein 150 feet in length, winze 66 feet deep. Three men employed sinking winze. There is a 5-stamp mill on property. L. A. Rehfus, of West Point, owner.

Deer Lodge Mine (quartz). It is 7 miles east of Murphy, on slope of Stanislaus Canyon. Two tunnels on vein, upper tunnel 100 feet long, lower 200 feet in length. Idle. P. E. Condit, J. N. Condit, of Murphy, owners.

Delmatia Mine (quartz). (See Report XIII, p. 101.) It is 7 miles northwest of Murphy, on ridge between San Antonio and Indian creeks. Vein 12 inches wide, developed by tunnel 100 feet long and a shaft 200 feet deep. Equipment, 35 h.p. boiler, 25 h.p. single-drum steam hoist, 1 drill Giant compressor. Idle. Marco Bozavich, Joe Tremantina, of Esmeralda, owners.

Del Monte Mine (quartz). Located 4 miles southeast of Glencoe, on ridge south of the North Fork of the Calaveras River. In the slates of the Calaveras formation. Vein 2 to 5 feet in width. Strike east and west, dip 85° N. Work carried on through crosscut tunnel 1100 feet long, drifted 285 feet E. and 300 feet W. on vein. Three hundred feet above lower tunnel a tunnel 1200 feet long has been driven on vein. Three shoots of ore developed on upper tunnel 100 feet in length with an average width of 3 feet. No ore developed in lower tunnel. Equipment consists of 3 drill Rix compressor, 60 h.p. boiler, 35 h.p. steam engine, 10-stamp mill. Property being reopened. Six men employed. Del Monte Consolidated Mining and Reduction Company, Meadville, Pennsylvania, owners. Geo. I. Wright, superintendent.

Demarest Mine (quartz). It is five miles west of Angels, near the Copperopolis road. Controls 340 acres under agricultural patent. An incline shaft has been sunk on the vein for a depth of 700 feet and drifted on the 200, 300 and 600 foot levels. Mine equipment consists of two 60 h.p. boilers, 10″ x 12″ single-drum steam hoist, 10″ x 14″ air compressor (350 cubic feet of air).

Mill: 8″ x 10″ Blake crusher, run by 12 h.p. steam engine. Five stamps, weight 1000 pounds each, 2 Pacific vanners. Mill run by 10″ x 12″ steam engine. Idle. Demarest Gold Mining Company; D. C. Demarest, L. Monteverda, of Angels, owners.

Dodson (Dodson & McQuig) Mine (quartz). (See Report XII, page 92.) It is 1½ miles west of Murphy, on southeast slope of Hulda Mountain. Vein 12 inches wide. The formation is black siliceous slate. Tunnel 100 feet long. Idle. Henry Stienbeck, of Murphy, owner.

Dutchess Mine (quartz). It is 4 miles southeast of Vallecito. Vein lies in granite, striking northeast and southwest, dipping 75° N., having an average width of 3 feet of quartz containing about 8% pyrite. This vein had been developed by a tunnel 1600 feet in length. Ten-stamp mill on property. Idle. William Lilley et al., of Indiana, owners. William Bravin, of Angels, agent.

Easy Bird Mine (quartz). Situated 2 miles northeast of Mokelumne Hill, on ridge southeast of Mokelumne River. Controls the following claims: Easy Bird, Humming Bird, John Pierpont Morgan. Vein has an average width of 8 feet, course east and west, dip 45° N., with a granodiorite footwall and slate hanging-wall. Workings consist of a crosscut tunnel 250 feet to vein, with a drift 1300′ W. and 500′ E. The ore has been stoped out above the tunnel level to surface.

Mill: 10″ x 20″ Dodge crusher, 10 stamps, 1000 pounds each, four 6-foot Frue vanners, mill driven by 25 h.p. Westinghouse motor. Idle. Outlook Mining Company of Boston, Mass., owners.

Economic Mine (quartz). Located 9 miles north of Angels, on San Antonio Creek, at an elevation of 1100 feet. Vein 6 feet in width, occurring in black siliceous slate, with a course of east and west, dip 75° N. Work carried on through tunnel 700 feet long.

Equipment: 2 drill Ingersoll-Sargent compressor operated by 4-foot Pelton wheel.

Mill: 10″ x 20″ Blake crusher, 20 stamps weighing 1000 pounds each, five 4-foot Frue vanners, driven by 6-foot Pelton wheel. Water supply taken from San Antonio Creek by fourteen miles of ditch and pipe line. Electric machinery is being installed to run mill. Thirty men are employed. Standard Amalgamated Exploration Corporation, P. O. Box 3059, Boston, Mass., owners. V. M. Weil, general manager; C. H. Cuneo, superintendent.

Edna Mine (quartz). (See Report XII, p. 92.) It is 4 miles northwest of San Andreas. Shaft 145 feet deep on the property. Idle. J. Stephen White, Monadnock Building, San Francisco, Cal., owner.

Eida Mine (quartz). One mile south of Mountain Ranch, on ridge between El Dorado and Murray creeks. Shaft 85 feet deep. Prospect. Idle. E. C. Rigney, of Eldorado, owner.

Esmeralda Mine (quartz). (See Report VIII, p. 133.) It is located 6 miles southwest of Sheep Ranch, on ridge between Indian and San Antonio creeks. Workings caved. Idle. John F. Davis, 785 Market street, San Francisco, owner.

Etna King Mine (quartz). Located north of the Gold Cliff mine, on the southeast slope of Democrat Hill, at an elevation of 1490 feet. Consists of three patented claims, Seigel, Widow and North End, with area of 46 acres, on the same vein as the Gold Cliff. Work is carried on through a 3-compartment, 4½′ x 13½′ in clear, vertical shaft 240 feet deep. The vein has been drifted on 100-foot level, for a distance of 200 feet, on the 200-foot level for 300 feet. The development work shows a vein with an average width of 12 feet with a strike of northwest and southeast, and dipping 80° NE. Ore hoisted by a single-drum 25 h.p. steam hoist. Development work is driven with air drills, air furnished by 2-drill Rand steam-driven compressor. Two 60 h.p. horizontal boilers, oil used for fuel, furnish steam power for hoist and compressor and pumps.

Mill: 9″ x 15″ Blake crusher, 20 stamps weighing 1000 pounds each, four 4-foot Frue vanners. Mill driven by 50 h.p. motor. Mine and mill shut down, only work being done is in unwatering property, with the intention of resuming operations. Four men are employed. Etna King Mining Company, owners, San Joaquin Valley Bank Building, Stockton, Cal. President, Dr. G. Pache, of Angels; secretary, A. S. Cohn; J. P. Taggart, general manager.

Eureka (Old Henry) Mine (quartz). It is 1½ miles northeast of West Point, on ridge between Mott's Gulch and Skull Flat Gulch. Shaft 135 feet deep. Caved. Idle. J. Rowe and J. Jenkins, of West Point, owners.

Everlasting Mine (quartz). (See Reports X, p. 63; XII, p. 92.) It is 1 mile south of San Andreas, on the Copperopolis road. Shaft 150 feet deep. Caved. Idle. Lowell N. Reynolds, No. 15 Court Square, Boston, Mass., owner.

Excelsior Mine (quartz). It is a prospect 1¼ miles northeast of Mokelumne Hill. There is a 100-foot tunnel. Idle. C. Peek of Mokelumne Hill, owner.

Fellowcraft Mine (quartz). (See our Reports X, p. 149; XI, p. 978; XII, p. 92.) It is situated on the eastern outskirts of San Andreas. A shaft has been sunk to depth of 216 feet at an angle of 54°, and levels run at 50′, 100′ and 200′ depths, and a crosscut run 100 feet in the footwall country rock on 100-foot level. Strike of the vein is N. 18° W., with a dip of 55° E. The equipment on the property consists of single-drum steam hoist, 80 h.p. Park & Lacy horizontal boiler, 10 stamps, weighing 750 pounds per stamp, two 4-foot Frue vanners, 1 Wilfrey table. Mill driven by 50 h.p. Park & Lacy steam engine. Idle. G. Tiscornia Company, of San Andreas, and A. N. Lewis Estate, of San Francisco, owners.

Ferguson Mine (quartz). It is 3 miles east of West Point. Shaft 112 feet deep, caved. Idle. David Porteous, J. P. Porteous, D. Oliver, of West Point, owners.

Fidelity Mine (quartz). Prospect. One mile south of Glencoe, on Cedar Gulch. Shaft 200 feet deep, caved. Idle. John L. Innis, of San Francisco, Cal., owner.

Fine Gold Mine (quartz). (See Report VI, Part II, p. 34.) Situated 4 miles east of Railroad Flat, on ridge southwest of the South Fork of the Mokelumne River. Shaft 260 feet in depth. Idle. James B. Haggin Estate, owner.

Finian Mine (quartz). (See Report XIII, page 104.) It is 4 miles north of Murphy, located in the Washington mining district, on ridge between Indian and San Antonio creeks. Course of vein east and west, dip 75° S. Shaft 200 feet deep. Idle. Willard Mining Company, Boston, Mass., owner.

Finnigan Mine (quartz). (See Report XIII, page 104.) Elevation 1400 feet. Located on the northeast slope of Carson Hill, near the town of Carson Hill. Consists of two claims, Finnigan and Finnigan Extension. The ore body is from 70 to 100 feet wide between walls, with a hard greenstone on the footwall and heavy vein of quartz for hanging-wall. General course of vein is northwest and southeast, dip 70° NE. The mine is worked through a tunnel 300 feet in length and 120 feet below apex of hill. The ore is mined above this tunnel by means of an open cut. Air drills are used in mining and development work, air being supplied by 2-drill Sullivan air compressor, driven by 50 h.p. General Electric Company motor. Ore is free milling, carrying from 1 to 3% pyrite; average value of ore milled is about $2.50 to $3 per ton.

Mill: 9″x12″ Blake crusher, 10 stamps weighing 900 pounds and dropping 6 inches at 108 drops per minute, crushing 4 tons per stamp through 20-mesh wire screen. Inside and outside amalgamation used. Pulp from batteries concentrated on two Gates shaking tables and two 4-foot Frue vanners. Mill driven by 50 h.p. Westinghouse motor. Electric power is furnished by Union Water and Power Company, at a cost of $5 per horsepower. In milling an extraction of 85% is made with a loss of $0.22 in tailings. Concentrates give an average value of $30 per ton, which are shipped to Selby Smelting Company. Total operating costs are $1.90 per ton. T. C. Talbot, Mrs. J. C. Talbot et al., of Carson Hill, owners. T. C. Talbot, manager.

Florence Mine (quartz). It is 4 miles north of Murphy, on south side of Indian creek. Tunnel 150 feet long. Idle. Deserey Frecot, of Sheep Ranch, owner.

Ford Mine (quartz). It is ¼ of a mile east of Mother Lode at San Andreas. A shaft 700 feet deep has been sunk on the vein. The ore bodies have been developed by levels at 100, 200, 300 and 400 feet. The ore zone of this mine may be described as a mineral belt consisting chiefly of chloritic and talcose schist lying upon a quartz schist footwall, and having a hanging-wall of diorite. This belt is about 100 feet wide and within it occurs large lens-like masses of quartz. The ore body contains a variable percentage of pyrite. The vein has a strike of N. 20° W. and dip of 65° E. This vein has numerous small stringers of quartz running into it, and has been reported to have been very rich at intersection of the vein and feeders. The trend of the ore shoot is toward the north. A small prospect shaft has been sunk on a parallel stringer lead 200 feet east of main shaft, and some very rich pockets taken out recently. Main shaft caved and in poor condition.

The equipment on property consists of a steam hoist and small compressor. Two men are at work in new prospect shaft. W. A. Dower and L. Hawes, of San Andreas, owners.

Fricot Group of Mines (quartz). They are located 6 miles southwest of Sheep Ranch, on ridge between San Antonio and O'Neils creeks. Consisting of following claims: Columbus, Rochester, White Pine, New Orleans, Philadelphia, Oswego, Albany, Gov. Davis, Twentieth Century, Horseshoe, Bonanza Placer; total of 179 acres. Series of parallel east and west veins dipping to north, with an average width of 2 feet. Also a series of north and south stringer veins, formation being a mica schist. Numerous shafts have been sunk on these veins with depths of 90 to 150 feet, also tunnels of various lengths from 50 to 430 feet. Albany tunnel is a crosscut tunnel 430 feet long. D. Fricot, of Angels, owner.

Garibaldi Mine (quartz). It is located 3 miles north of Angels. The property has been developed by crosscut tunnel 400 feet in length and a drift north of the vein for a distance of 60 feet. Width of vein over 100 feet composed of heavy white quartz croppings and talcose slates intersected by numerous quartz stringers. Idle. John Seiffert, of San Andreas, owner.

Gerabaldi Mine (quartz). At Glencoe, on ridge northeast of Cedar Gulch. Prospect, two shafts, 40 feet and 60 feet deep. Idle. Bertola Malispieno, of Glencoe, Cal., owner.

Geravanti Mine (quartz). It is 3 miles west of Mokelumne Hill, on ridge south of Mokelumne River. Prospect. Idle. John Geravanti, of Mokelumne Hill, owner.

German Ridge and Jupiter Mines (quartz). (See Report X, page 148.) Located 3 miles northeast of Altaville. Controls two claims and two millsites, Jupiter, Jupiter Millsite, German Ridge, and German Ridge Millsite, consisting of 85 acres. Strike of vein is N. 47° W. with a dip of 70° NE. Crosscut tunnel on property 600 feet in length which gives 700 feet of backs. Extensive superficial developments have been made on the property in search of pockets. Idle. W. H. Steffler Estate, of San Andreas, owner.

Gilbertson Mine (quartz) It is 4 miles northeast of West Point on ridge southeast of Mokelumne River. Tunnel 70 feet long on vein. Shaft 70 feet deep. Idle. Standard Electric Company, San Francisco, Cal., owners.

Ghost Mine (quartz). (See Report XIII, page 105.) It is located $\frac{1}{4}$ of a mile south of Angels. Controls 821 acres. There are two vertical shafts on the property, north shaft being 1350 feet deep and south shaft 350 feet deep, both sunk in the greenstone which is on the footwall of the vein. Crosscuts were driven at 900 and 1350 feet in north shaft, cutting a vein 20 feet in width at a distance of 200 feet from shaft. No further work was done in developing the property. Equipment at north shaft, two 75 h.p. horizontal boilers, 75 h.p. double-drum steam hoist, 2-drill Ingersoll compressor. At south shaft 75 h.p. double-drum hoist. Calaveras Cooperative Mining Company, Bonebrake & Son, J. Drake, of St. Louis, Mo., owners.

Glencoe Mine (quartz). It is 1 mile northwest of Glencoe, on Valentine Gulch. Controls the following claims: Mexican, Sara Queen, Stietzer, Valentine, 80 acres. Sara Queen tunnel 1900 feet in length. Mexican shaft 150 feet deep. No. 1 Valentine tunnel 500 feet, No. 2 Valentine tunnel 500 feet. Width of vein 5 feet, strike due E. & W., dip 60° N.

Mill: 10″x20″ Blake crusher, 20 stamps weighing 850 pounds, 2 Gilpin County shaking tables. Idle. Glencoe Mining Company, 4226 Terrace street, Oakland, Cal., owners; W. C. Childs, president; J. M. Gillespie, secretary.

Gold Cliff Mine (quartz). (See Reports X, pp. 60, 150; and XII, p. 92; M. and S. Press, Nov. 26, 1904.) This property is one of the Utica Mining Company group of mines, and lies just west of Angels Camp. Consists of the following claims: Pilot Nob, Gold Cliff, Madison, Specimen, Fairfax, Excelsior, Peachy, No. 1 and No. 2 Placer Claim. This mine is on a westerly splitoff from the main Mother Lode vein. The ore shoot on the vein has a trend towards the north. The general course of vein is northwest and southeast with a dip of 45° NE. A 3-compartment incline shaft has been sunk from level of old open cut on an incline of 45°, to 1600-foot level, from which point it is sunk on 12° incline to 1800-foot level. The mine is at present being operated from the 1500, 1600, 1700 and 1800-foot levels; mine stoped out above 1500-foot level. The method of mining the ore is by open stope and pillar system, very little timbering being done. Ore hoisted from incline shaft in 4-ton skips by a 225 h.p. double-drum electric hoist.

Mining is done with air drills, air being supplied by 30-drill Laidlaw-Dunn-Gordon compressor, electrically driven. Mine makes a small amount of water, which is handled by a 4-inch seven-stage Dowell pump driven by 75 h.p. motor. Ore trammed from shaft to mill by electric traction.

Mill: 10″x20″ Blake crusher, 40 stamps weighing 1000 pounds per stamp, dropping 7 inches at 104 drops per minute, crushing 5 tons per stamp through 20-mesh wire screen. Battery pulp concentrated on twenty-four 4-foot Frue vanners; 100 h.p. Westinghouse motor drives mill. Electric power furnished by Union Water Company. A saving of 90% is made by amalgamation and concentration. Tailings loss amounts to $0.20 per ton. Concentrates are valued at $30 to $50 per ton. Ninety-six men are employed. F. T. Martin, general manager. Hayward, Hobart and Lane estates, owners, Merchants' Exchange Building, San Francisco.

Gold-Galena Mine (quartz). It is 2 miles northeast of West Point, on ridge southeast of Skull Flat. North shaft 300 feet deep, south shaft 175 feet deep. Idle. John Breuner, Sacramento, owner.

Gold Hill Mine (quartz). Three miles south of Murphy. Shaft 110 feet deep. Three tunnels, 80, 125 and 300 feet in length. Idle. George Taylor, of Murphy, owner.

Gold Hill Mine (quartz). It is located 6 miles south of Angels. Controls 60 acres. Vein has a strike of north and south, dipping 60° E., with a width of ore from 20 to 100 feet. Operated through a 600-foot tunnel, ore mined above tunnel by open cut. Five-stamp mill. 900-pound stamps, two 4-foot Frue vanners. Ten men employed. Martin Voinich & Bros., of Angels, owners. Martin Voinich, superintendent.

Gold King Mine (quartz). It is 8 miles east of Railroad Flat, on Licking Fork of Mokelumne River. Tunnel 214 feet on vein, winze 75 feet deep. Idle. J. T. Jones, of Railroad Flat, owner.

Golden Gate Mine (quartz). Located 1 mile north of San Andreas, on the Mother Lode. Serpentine forms both the footwall and hanging-walls of this lode. To the westward is a broad zone of ankerite with its massive quartz outcrop and characteristic mariposite, and on the eastward of the serpentine is a diabase formation. Incline shaft sunk on a 75° angle on the lode, and ore developed on 200-foot level 400 feet to north; on 300-foot level 350 feet to north. Idle. W. H. Clary, of Stockton, owner.

Good Hope, Sunrise and Calaveras Queen Group of Mines (quartz). Located 4½ miles southeast of West Point, on ridge between the South Fork and Licking Fork of the Mokelumne River. Series of parallel veins cutting slates of the Calaveras formation. The course of veins is north and south, dip 65° E. Workings consist of two tunnels 340 and 120 feet long, and a shaft 100 feet deep. Two men are employed. George J. Porteous, of West Point, owner.

Good Hope Group of Mines (quartz). Located 1 mile north of Glencoe, on San Bruno ridge. Claims: Good Hope, San Bruno, Monte Cristo, Oriental. Porphyry dike on hanging-wall of vein. Strike of vein N. 65° E., dip 60° NW., width 5 feet. Good Hope tunnel 200 feet long, San Bruno tunnel 300 feet in length. Idle. Mrs. G. M. Danielson, of Glencoe, owner.

Gospel Mine (quartz). Three miles northwest of San Andreas. Ore was mined from an open cut to a depth of 20 feet. Idle. Martin Donallan, of San Andreas, owner.

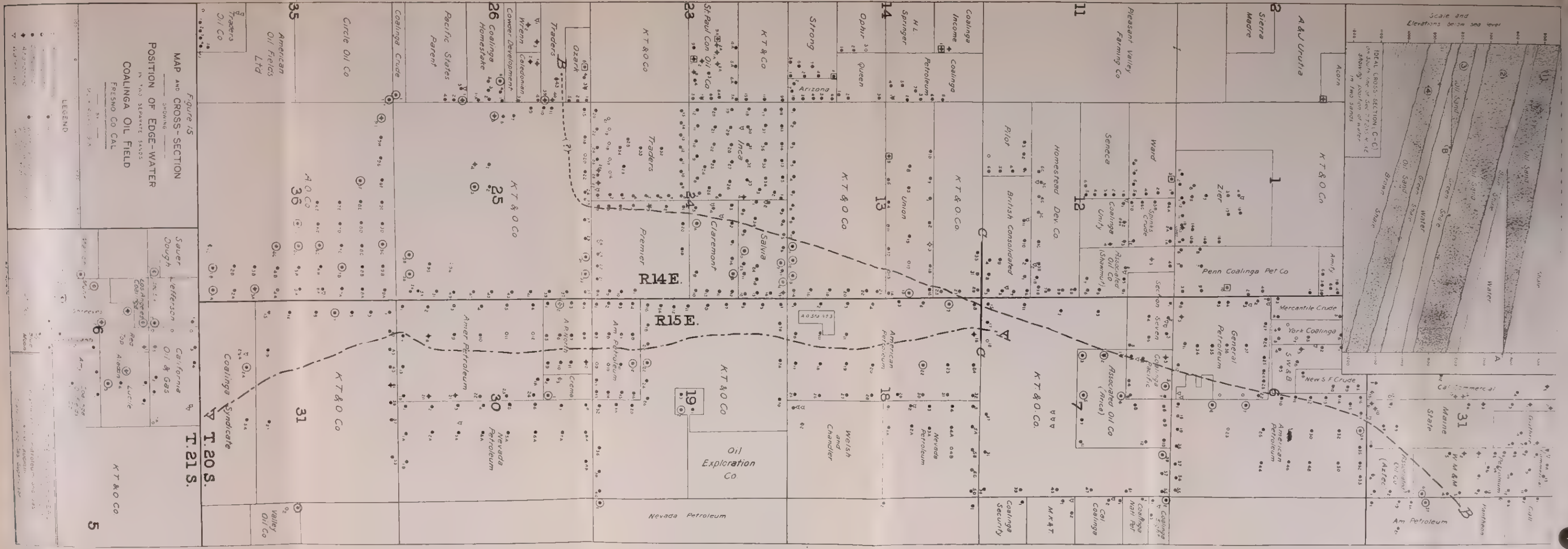


Figure 15

MAP AND CROSS-SECTION

SHOWING

POSITION OF EDGE-WATER

IN TWO SEPARATE SANDS

COALINGA OIL FIELD

FRESNO CO CAL

Gottschalk Mine (quartz). It is 1½ miles northwest of San Andreas, between the Calaveras River and Murry Creek, on the main Mother Lode. The main vein consists of a mass of heavy white quartz croppings which have a general course of northwest and southeast. Footwall of vein is a hard black slate and hanging-wall of amphibolite schists. There is series of east and west veins more or less parallel on which most of the development work has been done. Shaft 492 feet deep sunk on one of the east and west veins, and a tunnel 500 feet in length connects with shaft at 192-foot level. On the 100-foot level below tunnel a drift has been driven 200 feet SE. Idle. Mrs. C. V. Gottschalk, 1345 North Joaquin avenue, Stockton, owner.

The Gould Mine (quartz). The property is situated near the town of Carson Hill and controls four claims, Boston, A. P. A., Dirego, and Tariff Reform. General course of vein N. 45° W., dip 65° NE., ore similar in character to Finnigan. Work on property consists of a shaft sunk on the vein 75 feet deep, and a tunnel on vein 250 feet in length. Small amount of development work being prosecuted. Gould Gold Mining Company, owner. J. M. Jordan, of Oakdale, president and manager.

Grasshopper Mine (quartz). It is 4 miles southeast of Vallecito. A 3-foot vein has been opened up by two tunnels, upper tunnel 360 feet in length, giving 440 feet of backs. Lower tunnel 200 feet long, with 640 feet of backs. Porphyry forms both walls of vein. Two men employed driving lower tunnel. A. W. Slatten, of Vallecito, owner.

Gray Mine (quartz). It is 4 miles northeast of West Point, on ridge southeast of the North Fork of the Mokelumne River. Crosscut tunnel 200 feet long, 80 feet above lower tunnel there is a tunnel driven on vein 100 feet in length. Idle. Thomas Porteous, of West Point, owner.

Great Divide Mine (quartz). It is 2½ miles west of Murphy, on ridge between Angels and San Domingo creeks. Two parallel veins running east and west. Shaft 52 feet deep and tunnel 100 feet long. The formation is mica schist. Idle. F. A. Mitchell of Murphy, owner.

Great Western (*Right Bower*) *Mine* (quartz). (See our Report XIII, page 117.) It is 4½ miles west of Murphy, on ridge between Indian and San Antonio creeks. Vein 2 feet wide, very base, containing pyrite, zinc blende and galena, in mica schist. Shaft 200 feet deep on vein. Idle. W. Emerson and Bert Del Ray, of San Francisco, owners.

Great Western Mine (quartz). It is 4 miles southwest of Sheep Ranch, on ridge between Indian and San Antonio creeks. Claims are Great Western, Florence, Helena, and Annie Fraction. Total, 73 acres. Vein is 2 feet wide, with a course of N. 55° W., dip 65° NE. Work carried on through three tunnels, upper 175 feet long, middle 280 feet, lower 520 feet in length, which gives 400 feet of backs. The walls are a dark siliceous slate, and the quartz is found intimately associated with a porphyry dike. Three men are employed. H. J. Shepherd, Riley & Sons, 32 Glenn avenue, Oakland, owners; W. D. Riley, of Murphy, agent.

Guiffra Mine (quartz). At Mokelumne Hill, on Stockton Ridge. Shaft 105 feet deep, caved. Ten-stamp mill on property. Idle. John Guiffra of Mokelumne Hill, owner.

View of steel gallows frame at Gwin Mine, Calaveras County.

Gwin Mine (quartz). (See Reports VI, Pt. II, p. 30; X, p. 67; XII, p. 93. Folio 63, U. S. G. S., Mother Lode District.) Located 4 miles southwest of Mokelumne Hill at an elevation of 1040 feet, in a belt of Mariposa slates. The Gwin vein strikes with the slates and is generally parallel with their cleavage. It is accompanied by stringers, and varies in width, but is more of a regular vein than a stringer lead. Formations encountered in sinking the Gwin shaft are diabase tuff, clay slates and small acid dike rocks. Strike of main vein is N. 12° W., with a dip 68° E. which has a soft black slate gouge on footwall, with black slates on hanging-wall. The ore shoots of the main vein are of great length, varying in width from a few inches to 20 feet. The vein is usually of a banded structure and exhibits a branching tendency with many spurs running into the hanging-wall. Main shaft sunk in hanging-wall slates 2400 feet vertical, cutting vein at 1200-foot level, and the footwall of vein at 1245 feet. Winze 450 feet south of main shaft on 2400-foot level, having a depth of 450 feet.

Equipment: 118-foot steel head-frame, three 80 h.p. horizontal boilers, 20″x 36″ double-drum hoist, driven by either steam or water power (2 ten-foot Pelton wheels), waste water from hoist and mill stored in 75,000 gallon tank, from which tank it flowed through one 18″ pipe line and one 15″ pipe line to compressor plant on river, giving a head of 400 feet. Air was furnished by one 2-stage 18″x24″ Rix compressor, one 2-stage 15″x24″ Ingersoll-Rand compressor.

Mill: Two 10″x11″ Blake crushers, 100 stamps, weighing 950 pounds each. Twenty 6-foot Frue vanners, sixteen 4-foot Frue vanners. Mill was driven by water power. Property has been closed down since 1908. Gwin Mine and Development Company, 335 Mills Building, San Francisco, owners; Ansel M. Easton, president; J. J. Hachmann, secretary; Benj. Johnson, of Paloma, agent.

Another view of steel gallows frame at Gwin Mine, Calaveras County.

Hamby Mine (quartz). It is 4 miles southeast of Mokelumne Hill, on the Mokelumne Hill and Valley Springs road. Located on main Mother Lode belt, consists of 131 acres. The property was worked through a vertical shaft 300 feet deep, sunk in country rock. At a depth of 200 feet a crosscut was run 220 feet to cut vein, and the vein drifted on 400′ N. On 300-foot level vein was crosscut 200 feet from shaft and drifted 160′ N., and 125′ S. Course of vein is N. 25° W., with a dip of 70° E., width of orebody developed being from 10′ to 20′, consisting of quartz stringers running through schists with greenstone footwall and heavy gray slate hanging-wall. Property being reopened.

Mine equipment: 65 h.p. horizontal boiler, 50 h.p. double-drum steam hoist.

Mill: 10″x20″ Dodge crusher, driven by 15 h.p. motor, 20 stamps, weighing 1000 pounds each, four 6-foot Frue vanners. Mill driven by 50 h.p. motor. Twenty men employed. McKnight Mining Company, Pittsburg, Pa., owners. L. Everett, superintendent.

Hancock Mine (quartz). Located 2½ miles northwest of Mokelumne Hill, near Middle Bar bridge. A crosscut tunnel cuts vein, which crops out at the roadside a short distance from the mouth of tunnel. C. O. Mitchell, of Mokelumne Hill, owner.

The Hardy Mine (Hardy, McCreight & Reed) (quartz). Located on the north slope of Chaparral Hill, at an elevation of 1400 feet, 3 miles south of Angels. This property consists of two patented claims, Hardy, McCreight & Reed. Work is carried on through a tunnel 360 feet in length, and by winze sunk on vein to a depth of 300 feet. Strike of vein is northwest and southeast, dipping 47° NE. Ore body is a heavy white quartz highly impregnated with pyrite, the hanging-wall being of a soft porphyry and footwall of gray talcose slate. The vein has a width of 5 feet. Very rich pockets have been taken out of this property, these pockets occurring on the contact of quartz and porphyry. Ore free milling with 1 to 5% pyrite.

Mill: 4 stamps weighing 500 pounds to the stamp and dropping 6 inches at 112 drops per minute, crushing 3 tons per stamp through 20-mesh wire screen. Both inside and outside amalgamation used. From sluices the battery pulp runs over one 4-foot Frue vanner. Mill driven by 6 h.p. gasoline engine. Eight men are employed. Property being operated under lease and bond by James G. Maltman. Hayward, Hobart & Lane Estate, owners.

Hercules Mine (quartz). It is 5 miles north of Murphy, on ridge between Indian and San Antonio creeks. Hercules shaft 200 feet deep, on 100-foot level, drift 120 feet north, on 200-foot level, drift 150 feet north. Horseshoe shaft 160 feet deep. Idle. Dr. Hutchinson, of Los Angeles, J. Staples, of Murphy, owners.

Holland Mine (quartz). Located 1½ miles south of San Andreas, on Copperopolis road. Vein on contact of diabase on footwall, and talcose slate on hanging-wall. A crosscut tunnel 500 feet in length has developed a vein 16 feet in width, which gives 125 feet of backs. Idle. J. F. Holland, of San Andreas, owner.

Holmes Mine (quartz). It is 2 miles northwest of Glencoe, on ridge south of the South Fork of Mokelumne River. In granodiorite formation. Tunnel 375 feet long, width of vein 3 feet, strike N. 20° W., dip 50° W. Idle. Walter Holmes, of Valley Springs, owner.

Homestake (Dora) Mine (quartz). (See Report XII, page 92; XIII, page 102.) It is 3 miles north of Murphy. Two tunnels on vein, each about 200 feet long, shaft 75 feet deep. Vein 12 inches wide, occurs in a mica schist. Dora Mining Company, owners. Levi Samuels, of San Francisco, president.

Homestake Mine (quartz). It is 7 miles east of Murphy, on slope of Stanislaus Canyon. Three tunnels on vein, the lower tunnel 300 feet long and over 400 feet of drifting on vein. Vein is a dark quartz containing free gold, pyrite, zinc and galena. Idle. Mrs. I. T. Collier, of Murphy, owner.

Hudson and North Branch Mines (quartz). Are located 2½ miles northwest of San Andreas, on ridge northwest of the North Fork of Calaveras River. The vein occurs in the black clay slates with a strike of northwest and southeast. This system of veins lies to the west of the main Mother Lode. There is a shaft 300 feet deep on Hudson claim, and 100-foot shaft on North Branch. Idle. Mrs. A. Machiavella, of San Francisco, owner. Frank Solinsky, Monadnock Building, San Francisco, agent.

Idaho Consolidated Mines (quartz). They are 6 miles southwest of Sheep Ranch, on ridge between San Antonio and O'Neils creeks. Consisting of the following claims: Idaho, Grace Darling, Frontenac; total of 61 acres. These properties join the Fricot group, are similar in character as regards veins and formation. Frontenac tunnel 300 feet long. Grace Darling tunnel 172 feet in length. D. Fricot and Moore Bros., of Angels, owners.

Idora Mine (quartz). Two miles northeast of Mokelumne Hill, consisting of the following claims: Gushing Spring, St. Patrick, Idora, Big Fraction, and Fraction. Two series of parallel veins on property having north-south and east-west courses. They are prospects with only superficial development. W. T. Robinson, of Mokelumne Hill, owner.

Illinois Mine (quartz). It is located 7 miles south of San Andreas, on Copperopolis road, near Demarest mine. An incline shaft has been sunk to a depth of 200 feet and two levels opened. There are two veins, one running N. 5° E. and the other N. 30° W., converging northward. The formation is clay slate on the footwall and amphibolite schist on the hanging-wall. Idle. B. K. Thorn Estate, of San Andreas, owners.

Iron Rock Mine (quartz). (See Report XIII, page 109.) Situated on north slope of Carson Hill, and 4 miles south of Angels. Controls two claims, Iron Rock and Relief. Work was carried on through a tunnel 600 feet in length and 150 feet below apex of hill. Idle. Last work was in 1880. Frank Solinsky, Monadnock Building, San Francisco, Raggio Bros., of Angels, owners.

Isabel Mine (quartz). It is ½ mile west of Vallecito, on Red Hill. Shaft 75 feet deep. William Harfst of Vallecito, owner.

Jackson Mine (quartz). It is located 3 miles northwest of San Andreas on the North Branch and Valley Springs wagon road. The strike of vein is northwest and southeast, dip 70° NE. Vein is in black clay slates. Has produced some very rich pockets on intersection of this vein with east and west stringer leads. There is a series of shafts and tunnels 200 feet in length on these east and west veins. Two men are at work prospecting for pockets. John Jackson, of North Branch, owner.

The Jones Mine (quartz). Three miles south of Angels, shaft 600 feet deep, sunk on vein. This shaft is now caved, and all machinery has been removed. Ore reported very base, containing zinc and tellurides of gold and silver. Idle. D. B. Demarest, W. Garland, and R. A. Perano, of Angels, owners.

Josephine Mine (quartz). Prospect 2½ miles southwest of Railroad Flat. Shaft 50 feet deep. Idle. Paul Belisle, of Railroad Flat, owner.

Jumper (*Rose Rock*) *Mine* (quartz). (See Report XIII, page 117). It is 4½ miles north of Murphy, on ridge north of San Domingo Creek. Two tunnels driven on vein, upper tunnel 150 feet long, lower tunnel 230 feet in length. Idle. G. Goodwin, of Santa Cruz, owner.

K. & J. Mine (quartz). It is at Esmeralda, on ridge between San Antonio and Indian creeks. Shaft 100 feet deep, and tunnels 150 feet long. Idle. D. D. Demarest and E. J. Moore Estate, Angels, owners.

Keltz Mine (quartz). Situated 4½ miles northeast of West Point, on ridge south of North Fork of Mokelumne River. In granite. Five tunnels on property, all caved. Idle. Walter Morgan, Chas. Morgan, of San Francisco, owners.

Kenross Mine (hydraulic and quartz). It is 9 miles east of Mokelumne Hill, on ridge west of Esperanza Creek. Controls 320 acres of land. Idle. Kenross Mining Company, 1776 N. Hancock street, Meadville, Pa., owner.

Kentucky House Mine (quartz). It is located 3 miles south of San Andreas, on ridge between the juncture of Calaveritas Creek and South Fork of Calaveras River. Shaft 160 feet deep. Caved, and no work has been done on the property for years. Idle. J. C. Seiffert of Kentucky House, owner.

Kidoo Mine (quartz). Situated on the ridge between Indian and San Domingo creeks, about 2 miles south of Sheep Ranch. Comprises five claims: Edward, Nonie, Kidoo, Lemon, Peal. Shaft 50 feet deep. Two men employed. E. J. Bumstead, of Murphy, owner.

Lamphyre Mine (quartz). It is 1 mile south of Mokelumne Hill, on ridge east of Chile Gulch. Incline shaft 270 feet, vertical shaft 50 feet. Width of vein 8 feet, course N. 30° E., dip 60° E. Idle. F. A. West, of Stockton, G. P. Sperry, of Redwood City, owners.

Last Chance Mine (quartz). It is 2 miles west of Murphy, on ridge between Angels and San Domingo creeks. Shaft 130 feet deep. Idle. F. A. Mitchell, of Murphy, owner.

Last Chance Mine (quartz). It is located southeast of Utica mine, controlling 38 acres. Two shafts on the property, one 70 feet deep and the other 320 feet deep. Idle. Charles Tryon Estate, owners. Charles Tryon, Jr., agent.

Legal Tender Mine (quartz). (See Report XIII, page 110.) It is 5 miles north of Murphy, on ridge between Indian and San Antonio creeks. Strike of vein east and west, dip 80° S. Crosscut tunnel 147 feet long, vein drifted on 340 feet. Shaft 110 feet deep connects with tunnel. Two men employed. George Taylor, of Murphy, owner.

Lightner and Angels Mills, Angels Camp, Calaveras County, California.

Lightner Mine (quartz). (See our Report XIII, page 110; M. and S. P., November 26, 1904.) Is a fractional claim adjoining the Utica and Angels mines, on which a shaft has been sunk to a depth of 900 feet. The ore body has been opened up on 200, 300, 400, 500, 600 and 900-foot levels, all of which have been driven to end lines except 900-foot level, which has been drifted south 40 feet. The ore body is similar in character to Utica, consisting of amphibolite schists and gray slates above the 600-foot level. On the fourth, fifth, and sixth levels this ore body is 120 feet wide. On the lower levels ore body has a hard diorite footwall and diabase hanging-wall. Between 500 and 600-foot levels the ore is cut off by a zone of talc 15 to 20 feet thick with a dip of 30° NE. From the 600-foot level a winze has been sunk to the

900-foot level and a crosscut run which cut the ore body below this talc zone; the dip of the ore body was found at this point to be vertical, previous dip of ore body above the talc zone being 65° E. The vein on sixth level at 100 feet north of shaft splits into three veins with a barren zone of schists between.

Ore hoisted in 3-ton skips by double-drum electric hoist driven by 200 h.p. motor, from a 3-compartment vertical shaft (7′ x 16′ in clear) and dumped over grizzly, then to 10″ x 20″ Blake crusher, driven by 20 h.p. motor. There is a 500-ton storage bin under crusher. From shaft to mill bins the ore is hoisted in 3-ton cars over 30° incline, the hoist being a friction hoist run from line shaft of mill. Air drills are used in mining and development work. Air is supplied by a Rand compressor driven by 150 h.p. motor. Timber framer driven by 25 h.p. motor and a rip saw by 50 h.p. motor.

Mill: 60 stamps, weighing 900 pounds per stamp, dropping 7 inches at 104 drops per minute, crushing 5 tons per stamp through No. 1 tin screen. Battery pulp concentrated on thirty-six 4-foot Frue vanners, one half of gold values recovered by amalgamation inside of batteries, one fourth on outside plates, one fourth by concentration. An extraction of 90% is made. Loss in tailings 20¢ per ton. One 100 h.p. motor runs 40 stamps of mill, and a second 100 h.p. motor runs 20 stamps, tram, and concentrators. Total operating costs are $2.25 per ton. Timber costs 1⅛c per running foot. Lumber $18 per 1000 feet. Sulphurets run from $50 to $100 per ton and shipped to Selby Smelting Company. Freight rates from Angels to smelter are $4.75 per ton. Sixty-seven men are employed. Lightner Gold Mining Company, owner. President, C. M. Jackson, of Stockton; secretary, B. F. Wellington, of Stockton; Alexander Chalmers, general manager.

Lindsay Mine (quartz). It is ½ mile south of Altaville. Prospect. Idle. Prince, Bertha Peachy Estates, of Altaville, Owners.

Little Hero Mine (quartz). It is 1½ miles northeast of El Dorado, on ridge southeast of Corral Gulch.. Shaft 80 feet deep and tunnel 80 feet in length. Idle. John Raggio, of Stockton, Cal., owner.

Live Oak No. 1 and No. 2 Mine (quartz). One mile east of Mountain Ranch, on ridge north of Corral Gulch. Shaft 150 feet deep and tunnel 200 feet in length. G. Tiscornia and L. Cadmartori, of San Andreas, owners.

Lockwood Mine (quartz). (See our Report VIII, page 138.) Located 3 miles east of West Point, on ridge east of Bear Creek. Claims: Lockwood, East Lockwood, West Lockwood. Width of vein three feet, strike N. 23° W., dip 80° SW. The vein is opened by three shafts; north shaft 430 feet, middle shaft 160 feet, and south shaft 165 feet in depth. Work is at present being carried on in sinking north shaft. On 68-foot level drift N. 52′, S. 160′. On the 124-foot level drift N. 6′, S. 485′. On the 176-foot level drift N. 80′, S. 230′. On 230-foot level drift N. 140′ and S. 202′. On 325-foot level drift N. 325′ and S. 120′. Vein faulted north of north shaft 40 feet to the west. North of the shaft a series of diorite dikes cut the vein at right angles and have a dip of 70° S. South of the shaft a series of diorite dikes cut diagonally across the vein, having a dip of 70° S. The dikes have made no difference in the character of the ore, which is the same on each side. The dikes are of later origin than the vein. Numerous shear zones are noticed, having a course of N. 13° W., and it appears that where these shear zones come in contact with the vein an ore shoot is formed. The vein pinches and swells, wedge-shaped quartz forming on footwall and gradually widening to 2 or 3 feet and cutting across the fissure at a low angle to the hanging-wall, where it will pinch out.

There are two well defined shoots of ore, one north of shaft, the other south of shaft. Former 150 feet long with an average width of 2 feet, latter 100 feet long, having an average width of 18 inches. Both walls are granodiorite, the footwall being well defined while the hanging-wall is more or less fractured. The vein quartz is usually a vitreous bluish black variety. The ore is a heavy sulphide in character, consisting of pyrite, marcasite, pyrrhotite, galena, and sphalerite. Ore runs from $12 to $200 per ton.

Equipment: One 65 h.p. boiler, 6″ x 8″ single-drum hoist, 10″ x 10″ Ingersoll-Rand compressor. A 6″ x 4″ x 6″ Worthington pump lifts water from 330-foot level to 230-foot level, from which point it is pumped to surface by 7½″ x 5″ x 6″ Worthington pump, 18,000 gallons of water being handled in twenty-four hours. Shaft sinking cost $40 per foot. Drifting $15 per foot. Sinking operations are carried on with Jackhammer drills.

Company proposes to install a plant for treatment of the ore, similar to Black Oak mine in Tuolumne County. Fifteen men employed. This property is being developed on an extensive scale, no stoping is being done. Union Development Company, 713 Iowa Loan and Trust Building, Des Moines, Iowa, owner. W. O. Pray, general manager.

Lone Star (*Reed and Hillary*) *Mine* (quartz). Located 2½ miles northwest of West Point, on the North Fork of the Mokelumne River. Series of parallel veins in granodiorite formation, having a course of northwest and southeast, with a dip of 75° SW. Series of ore shoots from 100 to 320 feet in length, with an average width of 2 feet. Property developed by the following system of tunnels:

Tunnel No. 1	300′ length;	125 feet below outcrop
Tunnel No. 2	280′ length;	196 feet below outcrop
Tunnel No. 3	380′ length;	301 feet below outcrop
Tunnel No. 4	1,200′ length;	358 feet below outcrop
Tunnel No. 5	850′ length;	468 feet below outcrop

Shaft 300 feet deep sunk below No. 5 tunnel level. On Reed & Hillary claim:

Tunnel No. 1 ---------------- 360′ length; 160 feet below outcrop
Tunnel No. 2 ---------------- 550′ length; 226 feet below outcrop
Tunnel No. 3 ---------------- 700′ length; 336 feet below outcrop
Tunnel No. 4 ---------------- 800′ length; 446 feet below outcrop

Property Idle. Buildings and machinery in poor condition. J. H. Purdy, of Los Angeles, owner.

Lopez Mine (quartz). Near Esmeralda, on ridge north of San Antonio Creek. Shaft sunk on vein to depth of 180 feet. Idle. Jesus Lopez, of Esmeralda, owner.

Lucky Boy Mine (quartz). It is located 4 miles south of San Andreas, on the San Andreas and Copperopolis road. Vein occurs on contact of serpentine and schists. Shaft 105 feet deep on vein. Boiler and single drum steam hoist on property. Idle. James Waters, of San Andreas, owner.

Main and Fort Ritter Mines (quartz). It is 4 miles north of Mountain Ranch, on ridge north of Murray Creek. Prospect. Idle. C. F. Walters, M. Voorhies, of San Andreas, owners.

Maloney Mine (quartz). At Mokelumne Hill, on ridge south of Mokelumne River. Prospect. Idle. Mrs. Ella Maloney, of Mokelumne Hill, owner.

Mammoth and Jumper Mines (quartz). Two miles northeast of Mokelumne Hill, consisting of the following claims: Jumper, Mammoth, Challenge, Wabash, Midway. Series of north-south and east-west veins. Formation granodiorite and slate. Prospects with only superficial development. W. T. Robinson, S. L. Davidson et al., of Mokelumne Hill, owners.

Martha Mine (quartz). It is 4 miles northeast of El Dorado, on Murray Creek. Shaft 52 feet deep sunk on vein 3 feet wide with a course of N. 30° W. Idle. C. B. Coulter, of Mountain Ranch, owner.

Mascot Mine (quartz). Five miles east of Murphy, on Bald Mountain. Vein 2 feet wide, strike E. and W., dip 40° N. Tunnel 225 feet long. Shaft 85 feet deep. Idle. George Taylor, of Murphy, owner.

May Day Mine (quartz). It is 1 mile west of Murphy, on ridge between Angels Creek and French Gulch. Controls the following claims: May Day, Wide West, May Day Extension, Wide West Extension, Goldberg. Four parallel veins having an east and west course and dipping from 50° to 75° S. Crosscut tunnel 2000 feet long cutting all four veins. Series of prospect shafts on vein. Two men are employed. E. P. Heald, Healds Business College, San Francisco, owner.

Mayflower (*Banner*) *Mine* (quartz). (See Report XII, page 95.) It is 1 mile west of Murphy. There are two parallel veins. The formation is mica schist and quartzite. Veins strike nearly east and west and dip 85° N. Two shafts sunk on veins about 600 feet apart. East shaft 150 feet deep, west shaft 165 feet deep. East shaft in good condition, west shaft caved. Idle. W. Brady Estate, owners. Chas. A. Shertliff, trustee, 315 Laurel street, San Francisco.

The Melones Mine (quartz). (M. and S. P., Vol. XXXVI, pages 49 and 52.) It is located on Carson Hill and consists of sixteen claims, containing a total of 151.6 acres extending from the summit of Carson Hill to the Stanislaus River. This property has been under steady operation since 1898, the first 60 stamps of the 100-stamp mill having been installed in 1901. Included in this group of claims is the Stanislaus, which has yielded several varieties of telluride ores, including calaverite and melonite, which were first described from here.

Melones Dam on the Stanislaus River and portion of flume, capacity 5000 miner's inches. Dam is four miles above mill. Melones Mining Company. Photo by W. W. Bradley.

The general course of the vein is northwest and southeast with a dip of 70° NE., but at the 1350-foot level the vein flattens to 50°. This ore body has been opened up by a series of tunnels; the upper tunnel is 250 feet below the outcrop of vein, and is termed the 250-foot level; 875-foot level is also called South Carolina tunnel. The 1100-foot level or main working tunnel, size 7′x9′, is double tracked, and 5000 feet in length, cutting vein at 4000 feet from the mouth of tunnel. At this point a 3-compartment shaft, 5′x17′ in clear, has been sunk on the vein on an incline of 70° to the 1350-foot level; below the 1350-foot level the shaft continues on 50° incline as the vein has flattened at this point.

The amount of working drifts on each level, including adits, is as follows:

250-foot level	1,080 feet
450-foot level	810 feet
590-foot level	960 feet
875-foot level	3,030 feet
1,100-foot level	7,800 feet
1,350-foot level	500 feet
1,600-foot level	300 feet
1,750-foot level	150 feet

Making a total of 14,630 feet. Above the 1100-foot level the ore is being mined by means of the Glory Hole system, and worked below this level by shrinkage stope method, using a system of footwall crosscuts for opening up the ore body; the ore chutes under these stopes are a distance of 40 feet apart. The mill is run on ore from Glory Hole during the dry months of the year, and from stopes during the wet months. Ore trammed to mill from this tunnel by nine 8-ton cars hauled by direct current 500-volt locomotive.

Penstock and 6-foot redwood pipe line. Melones Mining Company. Photo by W. W. Bradley.

Rock hoisted from shaft by double-drum electric hoist, driven by 250 h.p., 220-volt induction motor, hoisting $3\frac{1}{2}$-ton skips at the rate of 1000 feet per minute.

Air drills are used in mining and development work. Air for drills is furnished by a Laidlaw-Dunn-Gordon (22″x24″) (14″x24″) 2-stage compressor. Mine makes only a small amount of water, which is hoisted in water skips.

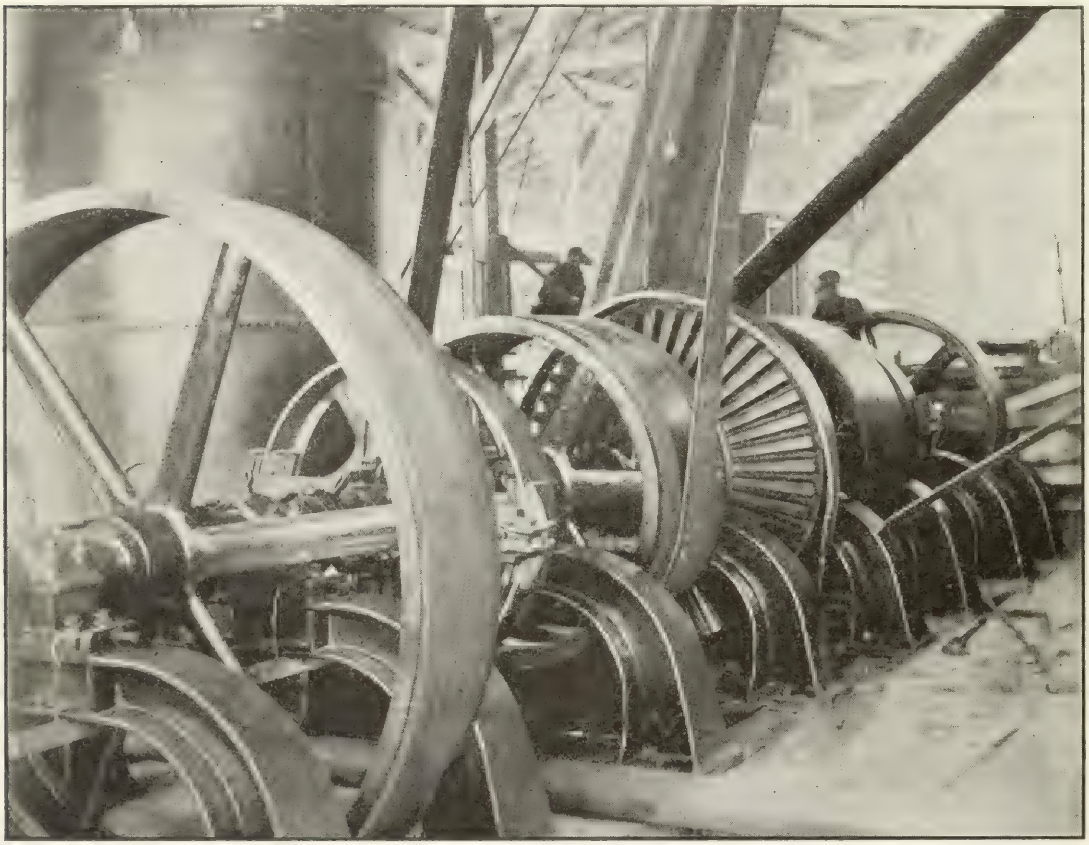
Mill: Ore crushed by two 5 D Gates gyratory breakers to two-inch size; from gravity crushers the ore is conveyed by 12-inch conveyor belt which distributes the ore onto a traveling Robins 24-inch automatic belt conveyor that discharges the ore at different intervals to bin of 1000 tons capacity. Ore from bins fed by Challenge ore feeders to 100 stamps, weighing 1050 pounds each, and dropping seven inches at 102 drops per minute, crushing 5 tons per stamp through 20-mesh screen; outside amalgamation used. The battery pulp from sluices to classifying cones, and concentrated on 27 Wilfrey tables, thirteen 4-foot Frue vanners, seven 6-foot Frue vanners, middlings elevated and reclassified and reconcentrated. Concentrates from tables and vanners are elevated to launders, where it flows to a 20-ton cyanide plant, capacity 600 tons per month. Value of concentrates is from $30 to $50 per ton.

100-stamp mill of Melones Mining Company, Melones, Calaveras County, California. Photo by W. W. Bradley.

Mill is run by water power, water supplied from Melones Mining Company dam on the Stanislaus River, and carried to mine through four miles of flume and through one thousand feet of pipe and tunnel. Capacity 5000 miner's inches. From end of flume the water is carried under mill in a 6-foot redwood stave pipe, 726.45 feet in length.

Additional electric power furnished by Sierra and San Francisco Power Company at a cost of $5.37 per h.p. Value of ore milled is from $2 to $2.50 per ton. Extraction of 83%, loss in tailings being about $0.25 per ton. Cyanide plant makes an extraction of 92% on sulphurets.

Total operating cost is $1.60 per ton. At present writing the mill is being overhauled, concrete foundations built under the batteries and the number of stamps increased to 120. The future plan will be to pay more attention to classification of products, with the idea of increasing the efficiency of the plant. Melones Mining Company, office 131 State street, Boston, Mass.; William G. Devereux, manager; T. A. Fulton, superintendent.



Main power shaft in mill of Melones Mining Company, Melones, Calaveras County, California. Photo by W. W. Bradley.

Mester Mine (quartz). It is located 3 miles northwest of San Andreas, joins the Hudson mine on northwest and the Jackson on southeast, and lies on the same system of veins. Idle. Mrs. Mester of Oakland, owner. Frank Solinsky, Monadnock Building, San Francisco, Cal., agent.

Mexican Mine (quartz). It is 1½ miles southeast of West Point, on Bummerville Ridge. Shaft 100 feet deep. Two men employed sinking shaft. F. Patterson, of West Point, owner.

Mina Rico Mine (quartz). It is 3 miles southeast of West Point, adjoining the Lockwood Mine on southwest. Three shafts, No. 1, 240 feet; No. 2, 112 feet; No. 3, 87 feet, sunk on vein. Idle. J. P. Peterson, Los Angeles, owner.

Minnie Mine (quartz). It is ½ mile north of Glencoe, on ridge north of Mosquito Gulch. Prospect. Four-stamp mill on property. Idle. Mineral Mining and Milling Company, Ira Longanecker, president, M. O'Callaham, secretary, Glencoe, Cal., owners.

Mitchell Mine (quartz). Prospect 3 miles southwest of Railroad Flat, on ridge south of Nelson's Gulch. Tunnel driven on vein 160 feet south. Shaft 60 feet deep. Idle. John Tone, of Stockton, John Gnecco, of Jesus Maria, owners.

Mohawk (Keystone) Mine (quartz). It is ¼ mile south of Railroad Flat. Developments consist of an incline shaft 260 feet deep, with three levels, 50, 100, 200-foot. Formation is black slate. Vein has an average width of 12 inches; strike N. 30° E., dip 45° E. Series of parallel porphyry dikes cut vein and form a zone of enrichment where they intersect the vein. Property being reopened. Two men employed retimbering shaft. J. F. Buyck, of Railroad Flat, owner.

Montana Mine (quartz). It is 4 miles west of El Dorado, on ridge north of Salamanda Gulch. Controls 30 acres. Vein with an average width of 2 feet opened up by two tunnels, upper tunnel 100 feet below outcrop is 170 feet long. Lower tunnel 600 feet long is 260 feet below apex of hill. Strike of vein is N. and S., dip 55° E. There are over 500 feet of raises and winzes on vein, and 400 feet of crosscuts. Four men employed driving lower tunnel to tap ore shoot which has a trend of 45° north, and was 100 feet long on upper tunnel. This pay shoot makes on contact of quartz vein with a porphyry dike. Two-stamp mill on property. Scossa Bros., of El Dorado, owners.

Monte Cristo Group of Mines (quartz). Located 6 miles north of West Point, on ridge south of the North Fork of the Mokelumne River. Series of parallel veins having a course of north and south with a dip of 80° W. Developments consist of a series of tunnels driven on veins. Idle. E. Sanderson Smith, of West Point, owner.

The Morgan Mine (quartz). (See our Reports IX, p. 37; X, p. 59.) Situated on northeast slope at Carson Hill, 4 miles south of Angels. The property consists of three patented claims, Morgan, Kentucky, Union. General course of vein is northwest and southeast with dip of 55° NE. The croppings of vein consist of a great vein of quartz from 60 feet to 100 feet in thickness, carrying a high percentage in pyrite. Ore is free milling. The ore was mined through a crosscut tunnel 900 feet in length. On this level 400 feet of drifting has been done on the vein. From the tunnel level a winze has been sunk on the vein to a depth of 400 feet. This mine has been idle since 1898. It was from this mine that the famous $300,000 pocket was taken, which included the largest single piece of quartz gold in the world ever taken out of the ground. It is described as resembling in shape the limb of a tree about 5 inches in diameter and 4 feet or 5 feet long. It is stated that in the early fifties the owners pounded out with a hand mortar and pestle, gold valued at $3,000,000 from pockets in this mine. Estate of James K. Fair, San Francisco, Cal., owner.

Moser Mine (quartz). It is 2 miles south of Mokelumne Hill, on Chili Gulch. Shaft 165 feet deep, on 430-foot level drift north 400 feet, south 410 feet; 495-foot level drift north 612 feet, south 800 feet; 595-foot level drift north 300 feet south 200 feet. Width of vein 5 feet, course N 30° E., dip 60° E. Footwall diabase, hanging-wall slate. Idle. S. S. Moser, of Mokelumne Hill, owner.

Mountain King Mine (quartz). It is 3 miles northwest of Copperopolis, adjoining the Royal group of mines on the northwest. An incline shaft has been sunk 500 feet on vein, which has an average width of 5 feet. Strike N. 60° W., dip 32° NE. Vein developed on 100, 200, 250, 400, 500-foot levels. Ten-stamp mill on property. Being reopened. R. P. Parks, Thomas Lockhard, Record Building, Stockton, owners.

Mountain View Mine (quartz). Prospect, 1 mile south of Glencoe, on Woodcock ranch. Shaft 125 feet deep. In slates of Calaveras formation. Width of vein 4 feet. Strike N. 30° W., dip 65° NE. Idle. J. B. Woodcock, T. B. Woodcock of Glencce, owners.

Mount Nebo Mine (quartz). (See Report XIII, p. 114). It is ½ mile west of Vallecito, on Red Hill. Vein strikes east and west, dipping 80° S. Width of vein being 12 inches with slate footwall and granite hanging-wall. Shaft 70 feet deep. Idle. Mrs. C. T. Hamilton, of Bakersfield, owner.

Mount Timolus Mine (quartz). It is 5 miles northwest of El Dorado, on ridge south of Salamanda Gulch. Vein 2 feet wide, with a strike of N. 75° E., dip 70° S. Shaft 300 feet deep, caved. New shaft being sunk on cross vein, present depth being 85 feet. Equipment consists of 9″x16″ rock breaker, 10-stamp mill. Four men employed sinking new shaft. Mount Timolus Mining Company, owner. J. A. Jack, president; Chas. Pomeroy, secretary; J. A. Jack, of El Dorado, manager.

Nelson Mine (quartz). It is 2 miles south of West Point, on an east and west vein with a dip of 80° S., in granodiorite. Series of shafts sunk on vein from 50 to 100 feet in depth. Two men employed. J. P. Nelson, of West Point, owner.

New York Mine (quartz). It is situated 1½ miles east of Railroad Flat, on New York Hill. Course of vein north and south, dip 75° E., in black siliceous slate formation. Shaft has a depth of 140 feet. Idle. J. Dalzell Brown, of San Francisco, owner.

Nixon Mine (quartz). It is 1 mile northeast of West Point. Two shafts on property, depths 185 and 150 feet. Idle. Mrs. M. A. Nixon of West Point, owner.

North Star Mine (quartz). Located 1 mile west of Angels, on a westerly branch of the main Mother Lode vein. Controls 46 acres of ground, including two mining claims called North Star and Yellow Metal. Strike of vein east and west, with an average width of 15 feet, dipping 60° to the north. Work is carried on through 3-compartment shaft (sunk on a 60° incline, 4′x15′ in clear, to depth of 480 feet). Head-frame 65 feet in height, containing ore bins and 10″x20″ Blake crusher driven by 30 h.p. motor. Ore hoisted in 1-ton skips by double-drum electric hoist driven by 100 h.p. motor. Mining and development work done with air drills, air supplied by 12 drill, belt driven, Sullivan compressor, driven by 100 h.p. motor.

Mill: 40 stamps, 1000 pounds per stamp; sixteen 4-foot Frue vanners driven by 50 h.p. motor. Property shut down, the only work being done is bailing water. Two men are employed hoisting water, company planning to resume operations in the spring. Dolling Gold Mining Company of Angels, owners. D. G. Overall, president, C. S. Berry, secretary.

North Star (*Sawyer*) *Mine* (quartz). A prospect, 2 miles east of West Point, on ridge east of Bear Creek. Shaft 60 feet deep. Idle. J. A. Gouldson of West Point, owner.

North Star (*Zacatera*) *Mine* (quartz). It is 2½ miles northeast of West Point, on ridge southeast of Skull Flat Gulch. Crosscut tunnel 400 feet long connects with shaft 340 feet deep. Five-stamp mill on property. Idle. Thomas Porteous, of West Point, owner.

Norwich Mine (quartz). It is ½ mile southwest of Glencoe. Shaft 200 feet deep. Idle. S. L. Davidson of Mokelumne Hill, owner.

Novella (*Chino*) *Mine* (quartz). It is 2 miles southeast of West Point, on ridge southeast of Soap Root Gulch. Shaft 112 feet deep. Idle. Frank Novello Estate, of West Point, owners.

Ohio Mine (quartz). It is 3½ miles north of Murphy, on Indian Creek. Two tunnels, upper tunnel 125 feet long, and lower 400 feet long, also a shaft 300 feet deep. Idle. George Taylor, of Murphy, owner.

Old McKinney Mine (quartz). It is 5 miles southeast of Mountain Ranch, on McKinney Creek. Shaft and workings caved. Domeghini Bros., of Mountain Ranch, owners.

Old Washington Mine (quartz). It is 6 miles northeast of Murphy, on San Antonio creek. Controls 40 acres. Two veins are exposed on surface. Washington vein has an east and west course, dip 75° N. Mammoth vein strikes northwest and southeast, dip 60° NE. Width of veins being 6 to 10 feet. Shaft 100 feet deep, on Washington vein. Formation is a siliceous slate. Idle. East Belt Development Company, 341 Thirteenth street, Oakland, owners. J. A. Campbell, of Murphy, superintendent.

Oriole Mine (quartz). Located 1 mile southwest of Angels. Shaft sunk on a vein called the Dead-Horse lead, to a depth of 850 feet, and levels run on vein at 100′, 200′, 300′, 400′, 500′, 600′ and 800′. Machinery dismantled and sold. Idle. Gould Mining Company, owner. A. S. Spool of Valley Springs, president, J. M. Jordan, of Oakdale, secretary.

Oromiento (*Calaveras*) *Mine* (quartz). (See Report XIII, p. 115.) It is 4 miles north of Murphy, on the Sheep Ranch road. Course of vein is N. 70° E., with a dip of 70° S. Shaft 500 feet deep sunk on a vein 2 feet wide of ribbon quartz containing pyrite, zincblende and galena and free gold. Idle. F. Horswill, of Oakland, owner. W. F. Oslin, of Calaveras, agent.

Oro-Plata Mine (quartz). (See Report VI, Part II, pp. 35–42.) It is at Murphy, controlling 120 acres, course of veins, N. 88° W., dip 75° S. Width of veins from 2 to 5 feet. Ore shoots have a trend of 50° E. Veins occur on contact of limestone and Calaveras slates, also along a porphyry dike. Work was carried on through two shafts, depths being 286 feet and 110 feet. The character of the ore is base, containing free gold, with zincblende and galena. Three veins on property, Bay Rock, Oro y Plata, Red Wing. Both shafts are full of water, 110-foot shaft caved. Idle. Willard Mining Company, Boston, Mass., owners; W. C. Hunneman, agent.

Paragon Group of Mines (quartz). They are 3 miles southeast of West Point, on ridge south of the Licking Fork of the Mokelumne River. Claims: Excelsior, Hidden Cave, Reliable. Excelsior tunnel 400 feet long, Hidden Cave tunnel 100 feet long, Reliable tunnel 400 feet long. In slates of the Calaveras formation. Series of parallel veins with a course of N. 10° W., dip 75° W., width of veins from 2 to 6 feet. Two men employed. J. L. Haley, of West Point, owner.

Peck Ranch Mine (quartz). Located 2 miles northeast of Mokelumne Hill. Controls 280 acres under agricultural patent. There are series of north-south and east-west veins on the property. A tunnel 950 feet long has been driven on a north and south vein, which gives 500 feet of backs. Vein has a dip of 45° E., having a footwall of granodiorite and a hanging-wall of slate. Width of vein from 6 to 20 feet. W. T. Robinson, of Mokelumne Hill, agent.

Petticoat Mine (quartz). At Railroad Flat. Vein 2 to 7 feet in width. Strike N. 15° W., dip 65° NE. Vein of ribbon quartz with 2 per cent pyrite, having a black slate gouge on footwall. Property developed by two incline shafts. South shaft 680 feet deep and north shaft having a depth of 210 feet, is 1200 feet north of south shaft. Steam hoist and compressor on property. Idle. Louis Rosenfeld, of San Francisco, owner.

Pilot (*Oro Fino*) *Mine* (quartz). Three and one half miles south of Eldorado, on ridge between O'Neils and McKinneys creeks. Shaft

180 feet deep. Steam hoist, compressor and 4-stamp mill on property, Idle. W. B. Swank, of Mountain Ranch, owner.

Pioneer Chief Mine (quartz). (See Report X.) It is 1¼ miles west of San Andreas, on the west or footwall fissure of the Mother Lode. The vein is found at contact of black slate and diabase, the latter on the footwall. Two shafts were sunk on the vein. North shaft 200 feet deep, and a shaft 125 feet deep about 200 feet south of north shaft. Both shafts caved. No data to be obtained in regard to workings. Idle. B. K. Thorn Estate, of San Andreas, owners.

Plymouth Rock Mine (quartz). Located 2 miles northeast of Jenny Lind, on ridge southeast of Calaveras River. Developments consist of a tunnel 362 feet long driven on vein, and an incline shaft 135 feet deep, 10-stamp mill on property. Idle. Mrs. A. L. Lane, of San Francisco, owner.

Price Mine (quartz). It is 5 miles east of West Point, on ridge south of Middle Fork of Mokelumne River. Shaft 60 feet deep. Tunnel 60 feet long. Three men employed driving tunnel. C. E. Price, of West Point, owner.

Prince Mine (quartz). At Altaville. Shaft 440 feet deep sunk on the vein. Equipment consists of 15 h.p. upright boiler, 15 h.p. single-drum steam hoist. Idle. B. R. Prince Estate, of Altaville, owners.

Purdy Group of Mines (quartz). They are situated 6 miles southeast of Valley Springs, on Bear Creek. In the black slates of the Mariposa formation. Idle. H. P. Purdy, W. H. Nelson, of Valley Springs, owners.

Quaker City Mine (quartz). See our Reports VIII, 144, and X, p. 65. It is 4 miles southwest of Mokelumne Hill. Idle. A. Knell, of Mokelumne Hill, agent.

Quartz Glen (*Foote & Thompson*) *Mine.* It is near Rich Gulch, 4 miles southwest of Glencoe. Property opened up by three tunnels on vein. Lower tunnel 600 feet long, upper tunnel 275 feet above lower tunnel 900 feet long. On opposite side of Alabama Gulch a third tunnel has been run 850 feet north on vein. Strike of vein is north and south, dip 70° W. Ten-stamp mill on property. Idle. Mrs. Frank Hopkins, of Los Angeles, owner.

Rand (*Poorman*) *Mine* (quartz). Located 2 miles east of Glencoe, on ridge south of South Fork of Mokelumne River. Claims: Poorman, Lawson, Ezra Extension. In the slates of the Calaveras formation. Porphyry dike on both walls of vein. Width of vein 3 feet. Strike due north and south, dip 65° W. Work carried on through 65° incline shaft 312 feet deep. On 160-foot level drift 125 feet N. and 90 feet S.; on 250-foot level drift 200 feet N. Sinking shaft and driving drifts north and south. Equipment consists of 60 h.p. boiler, 35 h.p. single-drum hoist and 5-stamp mill. Eleven men employed. Germiah List, president; Ezra Kellar, secretary, 1776 N. Hancock street, Philadelphia, Pa.

Rathgeb Mine (quartz). See Reports VIII, p. 147; X, p. 63. It is 3 miles southeast of San Andreas, on the Angels to San Andreas road. Vein strikes north and south, with a dip of 70° E., and is on contact of black clay slates and amphibolite schists. Shaft 220 feet deep sunk on vein. Idle. Judge Ira H. Reed of San Andreas, owner.

Recompence Mine (quartz). It is 6 miles west of Sheep Ranch, on ridge between San Antonio and O'Neils creeks. Shaft 65 feet deep. Tunnel 165 feet long. C. W. Sanders, of Angels, owner.

Red Gold (*Buckhorn*) *Mine.* (See Report XII, p. 90.) Two miles west of Murphy, on ridge west of Murphy. Controls 76 acres. Three parallel veins are exposed on surface. The formation is mica schist and quartzite with porphyry dike along each vein. General strike east and west, dip 60° to 80° S. Average width of vein being 12 inches. Shaft 300 feet deep and 100′, 200′, and 300-foot levels. Equipment 35 h.p. boiler, 25 h.p. single-drum steam hoist, 6-drill Hendy compressor, run by 50 h.p. General Electric motor.

Mill: 10″ x 12″ Blake crusher, 5 stamps, 900 pounds per stamp. California Buckhorn Gold Mining Company, Ogden, Utah, owners. J. A. Campbell, of Murphy, agent.

Ritter Mine (quartz). It is 2½ miles north of El Dorado, on ridge north of Murray Creek. Controls 77 acres. Vein 1 to 2 feet wide, opened up by tunnel 640 feet long and shaft 200 feet deep. Quartz is a ribbon rock, containing a very small amount of pyrites, ore occurring in kidneys. Both walls are dark siliceous slate. Equipment on property: 20 h.p. steam hoist, 6″ x 8″ Henry rock breaker, 5-stamp mill. Idle. Mechanics Mining Company, Koenig & Kroll Real Estate Company, 444 Eleventh street, Oakland, owners.

Riverside Mine (quartz). (See Report XII, p. 96.) Located 4 miles north of West Point, on ridge south of the North Fork of the Mokelumne River. Carlton tunnel 400 feet long. Riverside tunnel 300 feet long. Lower Carlton tunnel 200 feet in length. Workings caved. Idle. C. E. Cole, of Los Angeles, owner.

Rockingham (*San Pedro*) *Mine* (quartz). At Glencoe. West shaft 190 feet deep, east shaft 150 feet deep, width of vein 2 feet, strike E. and W., dip 45° W. Idle. S. A. Berry, of Glencoe, owner.

Rose Hill (*Rodesina*) *Mine* (quartz). (See Report XI, p. 176.) One mile west of El Dorado, on ridge south of El Dorado Creek. Tunnel 700 feet long and shaft 120 feet deep. Ten-stamp mill on property. Idle. Louis Emery, Jr., Bradford, McKean County, Pa., owner.

Rosella Mine (quartz). Located 6 miles southwest of Copperopolis, on ridge southeast of Buckhorn Gulch. Workings consist of two shafts. South shaft 180 feet, north shaft 280 feet deep. Hoist and 2-stamp mill on property. Idle. Rosella Mining Company, R. L. Gardner, president, R. L. Birdsly, secretary, 865 Vermont street, Oakland, owners.

Royal Consolidated Mines (quartz). (See Report XI, p. 168; Bull. 18, p. 126.) Located in Salt Spring Valley at Hodson, 3 miles northwest of Copperopolis. Controls the following claims: Pine Log, Royal Goodenough, Ant Hill, Emma, Railsplitter, Republic, Royal No. 2 (all patented), having a total area of 160 acres with 4500 feet on the lode. Property was operated extensively from 1895 to 1905, when closed down and no work done until present reopening. The quartz occurs in a series of large lenses in a dike of diabase. There are also numerous quartz stringers and veins which cut the hanging-wall transversely and intersect the main Royal vein, which has a strike of N. 50° W., dip 30° NE. Developments consist of 30° incline shaft 1100 feet deep.

Ore was mined from a Glory Hole above the 900-foot level and all the material above that level was put through the mill. Ore was hoisted in a 3½-ton skip from mine to crushing plant, where broken in a No. 7½ Gates gyratory crusher; raised by 30-inch belt type bucket elevator to a Gates revolving screen 54″ diameter by 50′ length; screened to 1 inch, oversize to two No. 4 Gates gyratory crushers from which crushed product to bins. From bins ore was trammed to mill by 25 h.p. electric motor in five 5-ton cars. Crushers, elevators and screen driven by 150 h.p. motor.

Mine equipment: One 80 h.p. boiler, two 150 h.p. boilers, 1500 cubic foot Ingersoll-Sargent compressor, driven by 100 h.p. motor.

Mill: 120 stamps, weighing 1150 pounds, 20 stamps to each section and each 20 stamps being driven by 50 h.p. motor; 24 Standard concentrators on first floor, driven by 30 h.p. motor; 6 Wilfrey tables and 6 Johnston vanners on second floor, driven by 30 h.p. motor. Mill and machinery in good condition. Ore reported to have milled $3.72 per ton. Recently purchased by S. M. Page, of Boston, Mass. Pumping out mine to resume operations. H. F. Gendar, superintendent.

Salvador Mine (quartz). It is 4 miles northeast of Jesus Maria, on ridge south of the North Fork of Calaveras River. In limestone formation. Width of vein 5 feet, strike due N. & S., dip 75° E. Lower tunnel 1000 feet long on vein. One hundred feet above lower tunnel there is a tunnel driven on vein 500 feet in length. Eight-stamp mill on property. Idle. T. H. Rooney, of San Francisco, owner.

San Andreas Mine (quartz). It is located ½ mile southeast of the town of San Andreas. On this property there has been sunk numerous prospect shafts in hunting for pockets. There are a large number of parallel and cross veins on the property cutting through the greenstone schists. Idle. B. T. Cannon, 505 Templeton Building, Salt Lake City, Utah, owner.

Satisfaction Mine (quartz). It is 1 mile northwest of San Andreas, joins the Gottschalk mine on the north. Martin Donallan, Frank Solinsky, of San Andreas, owners.

Scorpion Mine (quartz). It is 1 mile south of West Point, on ridge southeast of Soap Root Gulch. North shaft 275 feet deep. South shaft 65 feet deep. Idle. M. Denison, M. Postner, of West Point, owners.

Shaw Mine (quartz). It is 3 miles north of Murphy, on ridge between San Domingo Creek and Sullivan Gulch. Vein 2 feet wide, has a footwall of serpentine and hanging-wall of slate. Shaft 145 feet deep and crosscut tunnel 245 feet long connecting with tunnel. Idle. A. S. Shaw & Bros., of Murphy, owner.

Sheep Ranch Mine (quartz). (See Reports VIII, p. 131, and XI, p. 175. M. and S. P., July 1, 1905.) Elevation 2250 feet. At Sheep Ranch, on ridge between San Antonio and O'Neils creeks. Controls the following claims: Ferguson, Wallace, McNair, Aspinwall, North Star, Peoche, Salamanda, Admiral Dewey, Roscoe, Alabama, Franklin, Lodi, Eureka, Elk, Hurricane, Toom. Total area, 200 acres. The strike of vein is N. 56° W., dip 75° NE. Vein has a width of 1 to 2 feet, with a hanging-wall of gray slate and footwall of black siliceous slate. Ore occurs in shoots with a trend of 45° E. The quartz is free milling, most of the value occurring in free gold, the sulphurets being too low grade to ship, only running about $16 per ton. This property has been noted in the past for the high-grade specimen rock produced. There are three incline shafts on property. Sheep Ranch or Main shaft has a depth of 1350 feet. Chavanne shaft 600 feet southeast of main shaft is 600 feet deep, caved. Lodi shaft is 125 feet deep and sunk on a parallel vein. There are 8500 feet of drifts below 900-foot level, above this level the ore has been stoped out to surface and filled; 520 feet of crosscuts, 700 feet of winzes. Winze sunk back of shaft from 1300-foot level to depth of 200 feet; 1400-foot level drifted 900 feet to east from winze. On 1500-foot level drifted 150 feet east and 160 feet west. Only small amount of stoping has been done below 1300-foot level.

Equipment: Two 80 h.p. boilers, one 70 h.p. boiler, 200 h.p. engine, 16″ x 24″ double-drum steam hoist, 1 Burley upright compressor, driven by 100 h.p. motor (1200 cubic feet of air), 1 Burley upright compressor driven by 50 h.p. motor, 8-inch Cornish pump driven by 50 h.p. Westinghouse motor. This pump was capable of handling 150,000 gallons per twenty-four hours, raising water to 300-foot level to a drain tunnel 2400 feet long.

Mill: Twenty stamps, weighing 900 pounds each, 14″ x 26″ Blake crusher. Driven by 50 h.p. motor. Straight amalgamation was done in mill and no attempt at concentration was made, the tailings going to storage dam for treatment by cyanide plant. After mine was shut down a 50-ton cyanide plant installed to treat the stored tailings. Percolation method of treatment used. The cost of handling and treatment was 58 cents per ton. Some of the costs made when mine was in operation during 1907 are as follows:

Costs (not including administration charges):

Sinking main shaft	$48 25 per foot
Drifting	4 50 per foot
Sinking winzes	20 00 per foot
Mining, milling and development	7 50 per ton

During last operation 43,150 tons were milled from 1300 and 1400-foot levels, which had an average value of $10.65 per ton, on which an extraction of 80.3% was made in straight amalgamation.

This mine has record of treating 400,000 tons, and bullion receipts of $4,000,000. Idle since 1907. C. L. Feusier, of Sheep Ranch, owner, 1027 Green street, San Francisco.

Shenandoah Mine (quartz). (See Reports XI, p. 176; XII, p. 96.) Situated on Jesus Maria Creek, 5 miles northwest of El Dorado. The altitude of lower tunnel on creek is 1600 feet. Company owns three claims: Way, Hoosier, Mary Lory; also Way Mill site and Hoosier Mill site. Total of 63 acres. The country rock is a hydro-mica schist, and quartzite, east of which is an area of amphibolite schist and diorite; these rocks strike northwest. The system of fissures on lower workings N. 20° E., dip 60° W. Vein is white quartz with a width of 2 to 5 feet. The central portion of the vein, which extends over two spurs of main ridge, has, by weight of the mountain, been bent over to the east giving the vein a dip of 75° E., with a strike of N. 7° E. The torsion of the rocks has resulted in the faulting of the vein 40 feet to northwest. The mine is being operated from lower tunnel or No. 1, 1630 feet long, which gives 900 feet of backs on vein. Five other tunnels have been driven on vein, No. 2 tunnel at an elevation of 1770 feet is 800 feet long, No. 3 at an elevation of 2000 feet is 755 feet long, No. 4 at an elevation of 2043 feet has a length of 270 feet, Nos. 5 and 6 are short tunnels on vein, altitude of the latter is 2217 feet. The elevation of outcrop on top of ridge is 2500 feet.

Shenandoah Mill: One 8″ x 12″ Dodge crusher, 2 Challenge ore feeders, 10 stamps, 1000 pounds per stamp, dropping 6 inches, 100 drops per minute, crushing 3 tons per stamp through 30-mesh wire screen, two 6-foot Frue vanners. Mill run by 50 h.p. gasoline engine during dry season, and by water power taken from company ditch on Jesus Maria Creek. The power wheel is 3-foot Knight, running under a 90-foot head. Tailings from mill are being stored, as a cyanide plant is being installed for their treatment. Twenty-two men are employed. Shenandoah Mines Company, Clunie Building, 519 California street, San Francisco, owners. A. Tischer, manager.

Shotgun Mine (quartz). Situated 8 miles south of San Andreas on Cherokee Creek, near Demarest mine. The vein is a mass of quartz stringers cutting the gray slates, in a diabase formation. Shaft 70 feet deep on vein. Two men employed sinking shaft. J. J. Loyd, of San Andreas, owner.

The Smith & Crooks Mine (quartz). It is 2½ miles south of Angels. To the north of the Hardy mine. Ore has been developed by a tunnel 100 feet long and a shaft 33 feet deep. Width of vein is 20 to 50 feet. Two men employed driving tunnel. Norman Smith, of Angels, owner.

Smythe Mine (quartz). Report XIII, page 120. It is ¼ of a mile west of Vallecito, on Red Hill. Shaft 60 feet deep, and tunnel 300 feet in length. Idle. Chas. Smythe Estate, of Angels, owners.

Smythe Mine (quartz). (See Report XIII, p. 98.) It is ¾ mile northwest of Angels. Worked through a vertical shaft 200 feet deep, and opened up for 500 feet on 100 and 200-foot levels. Mine equipment consists of single-drum hoist driven by 25 h.p. motor; 2-drill Fairbanks-Morse compressor driven by 30 h.p. motor.

Mill: 9″ x 16″ Blake crusher, 10 stamps, 750 pounds per stamp, four 4-foot Frue vanners. Smythe Mining Company, of Angels; Chas. D. Smythe, general manager; L. Siegler, superintendent.

Soap Root Mine (quartz). It is 1 mile south of West Point. Shaft 185 feet deep. Idle. Martin Bergum, of West Point, owner.

Sonoma Mine (quartz). It is 4 miles north of Murphy, on Indian Creek. Two shafts, 125 and 110 feet deep. Idle. W. S. Sellsby, of Los Gatos, Cal., W. H., Whitney Estate, of San Franicsco, owners.

South African Mine (quartz). Located 4 miles south of Mokelumne Hill, on Old Woman's Gulch. Prospect. Idle. Geo. Edwards, of Mokelumne Hill, owner.

South Bank Mine (quartz). It is 4 miles north of Murphy, on Murphy to Sheep Ranch road. Shaft 300 feet deep, caved. Vein 12 inches wide in country rock of mica schist.

Mill: 9″ x 16″ Blake crusher, 20 stamps, 1000 pounds per stamp, four 6-foot Frue vanners. Idle. Clary Gold Mining Company, San Joaquin Valley Bank Building, Stockton, Cal., owners.

The South Carolina Mine (quartz). (See Report XIII, p. 120). This mine is situated 1 mile southeast of the town of Carson Hill, on the east slope of Carson Hill, at an elevation of 1700 feet. Consists of one claim 1500 feet by 600 feet. This property was reopened in 1903 and has been in steady operation since that date. General strike of vein is northwest and southeast, with a dip of 70° NE. The mine has been developed by a series of tunnels; the lower tunnel, 800 feet below the outcrop of vein on ridge, has a length of 1000 feet. Middle tunnel, 500 feet below apex of hill, is in a distance of 400 feet. Upper tunnel, 300 feet below apex of hill, has been driven on vein a distance of 300 feet. The work is carried on through this upper tunnel, the ore being mined by means of an open cut above tunnel level. The ore is free milling, carrying from 1 to 3% sulphurets.

Mill: 9″ x 15″ Blake crusher, driven by 20 h.p. motor. Twenty stamps weighing 1000 pounds to the stamp, dropping 6 inches at 100 drops per minute, crushing 5 tons per stamp through 20-mesh wire screen. Inside and outside amalgamation used. From the sluices the battery pulp passes over four Union concentrators. A 50 h.p. motor drives stamps and concentrators. Electric power is supplied to plant by Union Water and Power Company at a cost of $5 per horsepower.

Ore being milled averages from $2.50 to $5 per ton, and an extraction of 75% is made, tailings running as high as $1.25 per ton due to tellurides in ore. Mining and milling costs are $1.75 per ton. Property is being operated under bond by South Carolina Mining Company, of Angels; T. A. Perano, manager.

Spring Day Mine (quartz). At Glencoe. In slates of Calaveras formation. South shaft 180 feet deep. North shaft 92 feet deep. Width of vein 2 feet, strike N. 10° W., dip 65° E. Equipment 5 h.p. gasoline hoist, 30 h.p. boiler, 10 h.p. single-drum steam hoist. Two men employed sinking north shaft. W. H. Pile, of Glencoe, owner.

Spring Gulch Mine (quartz). Prospect 2½ miles northwest of West Point, on ridge south of Skull Flat Gulch. Three men employed sinking shaft. H. J. Mason of Lodi, owner.

Starlight Mine (quartz). Three miles southwest of El Dorado. Shaft 145 feet deep. Idle. C. M. Ross and J. Johnson of Stockton, owners.

Star of the West Mine (quartz). Located 3 miles northeast of West Point, on ridge north of Skull Flat. Shaft 275 feet deep. On 100-foot level drift 80 feet north and 50 feet south. Average width of vein 18 inches, strike N. 15° W., dip 80° W. Granodiorite on footwall and hanging-wall. Equipment: 60 h.p. boiler, 25 h.p. single-drum steam hoist. Eight men employed. Chas. Harker and Mrs. M. B. Werle, care Western Gas and Acid Works, Emeryville, Cal., owners; J. J. Yeckel, manager.

Standard and Early Bird Mines (quartz). They are 3 miles southeast of West Point, on the Licking Fork of the Mokelumne River. In slates of Calaveras formation. Property being operated through two tunnels. Lower tunnel 85 feet long, upper 60 feet in length. Three men employed. J. L. Haley, of West Point, owner.

Steger Mine (quartz). It is 3 miles west of West Point, adjoining the Buena Vista mine. Steger tunnel 450 feet in length. Incline shaft 130 feet in depth. Adelaine shaft 150 feet deep. Average width of vein 18 inches, strike N. 12° W., dip 65° W. Formation is granodiorite Four men employed driving Steger tunnel. Three-stamp mill on property. Fernando Stewart, of Butte City, Cal., owner. Under bond to Edward Peabody, of West Point.

Stonewall Mine (quartz). (See Report XIII, page 120.) Three miles south of Murphy. Shaft 85 feet deep. Tunnel 620 feet long. Idle. George Taylor, of Murphy, owner.

Stonewall Jackson Mine (quartz). Three miles south of Glencoe, on ridge north of the North Fork of Calaveras River. Tunnel 300 feet on vein. Shaft 50 feet deep. Idle. J. C. Woodcock, T. C. Woodcock, of Glencoe, Cal., owners.

Sultana Mine (quartz). (M. and S. P., Nov. 26, 1904.) Situated to north of Angels Mine. Vertical shaft 700 feet deep sunk on vein. Two veins have been opened up on this property, on the 100, 300 and 700-foot levels. West vein has a hard diorite footwall and a heavy talcose slate hanging-wall, with a dip of 65° E. East vein hard diorite hanging-wall with heavy schists footwall, vein has a dip of 80° E. These veins are parallel, with a strike of northwest and southeast.

Equipment: Two horizontal boilers, 80 h.p. Rix double-drum hoist, 8-drill Rand compressor, 4-drill compressor made by Angels Iron Works, run by 40 h.p. motor. One 9″ x 16″ Blake crusher, run by 25 h.p. motor.

Mill: 20 stamps, 850 pounds each, 12 4-foot Frue vanners. Idle. Shaft caved. Property has not been in operation since 1905. Sultana Mining Company, of New York; Charles Jacobson, agent.

Summit Mine (quartz). Three and one-half miles south of Railroad Flat, on Esperanza Creek. Vein 2 feet wide with footwall of porphyry and hanging-wall of mica schist. Tunnel 288 feet long driven on vein. Idle. W. B. Swank, of Mountain Ranch, owner.

Sunrise Mine (quartz). Near Esmeralda, on ridge between San Antonio and Indian creeks. Prospect. Idle. F. Martin, Lawrence Bones, of Angels, owners.

Sunrise Mine (quartz). It is located ½ mile southwest of Vallecito on the east slope of Red Hill. Course of vein is northeast and southwest, having an average width of 3 feet, with a slate footwall and granite hanging-wall. Two tunnels on the vein, upper 110 feet long, lower 250 feet long. Two men employed driving lower tunnel. Sun Rise Mining Co., 545 Sixteenth street, Oakland, Cal., owners. William Harfst, manager.

Swiss Mine (quartz). It is 4 miles east of Railroad Flat, on ridge southwest of South Fork of the Mokelumne River. Shaft 204 feet deep. Tunnel 1200 feet in length. Course of vein is north and south, dip 75° W., averages 5 feet in width. Ten-stamp mill on property. Idle. T. W. Taylor, Judge Hancock et al., of Railroad Flat, owners.

Tanner Mine (quartz). It is $1\frac{1}{2}$ miles northeast of Murphy, on southwest slope of Chaparral Hill, controls 41 acres. Vein has an average width of 8 inches, with a strike of N. 30° E., dip 70° E. Both walls are of Calaveras slate. Work is carried on through a tunnel 700 feet in length, which gives 280 feet of backs. Ore high grade, averaging from $20 to $80 per ton. Equipment consists of 10″ x 10″ Nagle Corliss compressor driven by 30 h.p. motor.

Mill: 8″ x 12″ Dodge crusher, 7 stamps, 1000 pounds per stamp, 2 Challenge ore feeders, 1 Standard concentrator, 1 Gates vanner. Mill run by 50 h.p. motor. Ore crushed through 40-mesh wire screen. An extraction of 80% is made. Loss in tailings amounts to $1.14 per ton. Concentrates have a value of $15 per ton. Electric power from Union Water Company at $5 per h.p. Twelve men are employed. East Belt Development Company, 341 Thirteenth street, Oakland, Cal., owners. J. A. Campbell, manager.

Thorp Mine (quartz). It is 6 miles south of San Andreas, near Fourth Crossing. An incline shaft has been sunk 700 feet on 55° angle, on vein that consists of series of quartz veins and parallel stringers in a zone of schists 20 feet in width. On 300-foot level vein has been drifted on 200 feet to south; on 400-foot level, 150 feet to south; on 500-foot level 100 feet south; on 600-foot level 250 feet south. Mine equipment consists of one 60 h.p. horizontal boiler, one Babcox & Wilcox boiler, forty 4-inch tubes 14 feet long, 160 pounds pressure, double-drum hoist; 50 h.p. Atlas steam engine drove Cornish pump.

Mill: 10″ x 20″ rock crusher driven by 25 h.p. motor, 6 Challenge feeders, 30 stamps 1000 pounds each, twelve 6-foot Union concentrators. Mill driven by Westinghouse, Type C, 2-phase, 400-volt, 690 r. p. m. motor. Idle. A. F. Frey, Louis Allgewahr et al., of San Francisco, owners.

The "400" Mine (quartz). It is $\frac{1}{4}$ mile north of Mountain Ranch, on ridge west of El Dorado Creek. Shaft 200 feet deep sunk on vein 2 feet wide. Crosscut tunnel intersects shaft at 65-foot level. El Dorado Creek Mining Company, 1109 Eighth street, Oakland, Cal., owners. Chas. Tepper, of Mountain Ranch, agent.

Tom Smith Mine (quartz). It is 1 mile northwest of Sheep Ranch, on ridge between San Antonio and O'Neils creeks. Vein 18 inches wide, strike N. 56° W, dip 45° NE. There are two tunnels on vein, upper 400 feet long, lower 800 feet in length. E. C. Dixon, Caldwell Bros. et al., of Stockton, Cal., owners. Under option to Jobe Evans and Harry Bates, of San Francisco. Twelve men employed. Harry Bates, manager.

Tryon Mine (quartz). It is $\frac{1}{4}$ mile south of Angels. There is a shaft 320 feet deep sunk on the vein. Idle. Charles Tryon, of Angels, owner.

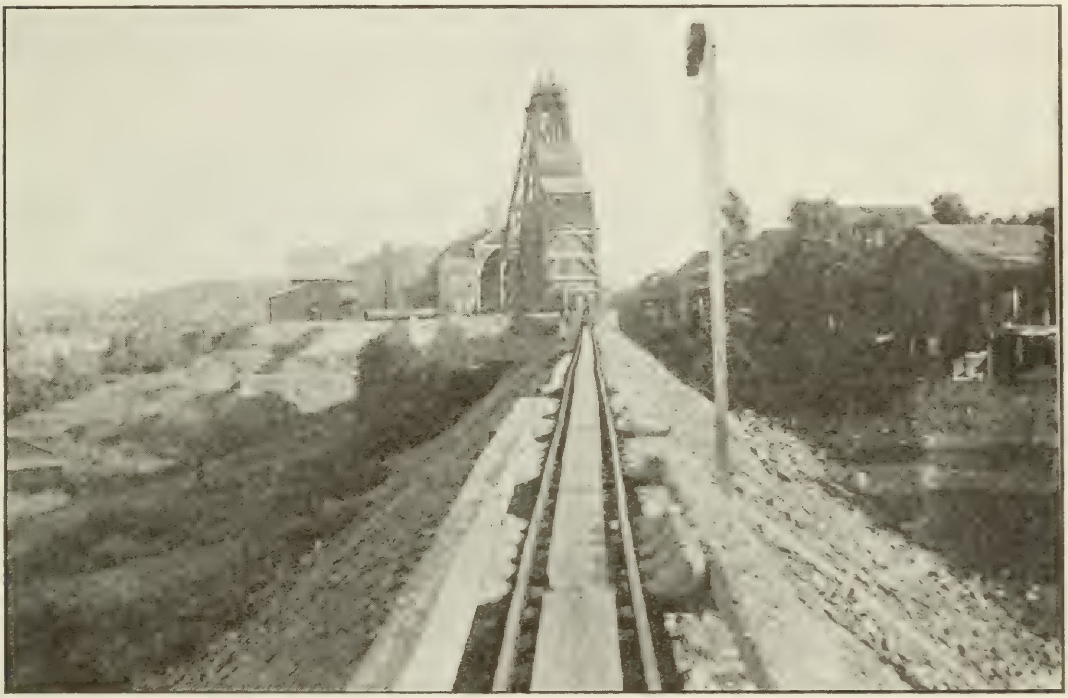
Tullock Mine (quartz). (See Report XIII, p. 98.) This mine is situated $2\frac{1}{2}$ miles south of Angels on Albany Flat, at an elevation of 1400 feet. Vein has a strike of N. 50° W., and dipping 45° NE.; both the foot and hanging-walls are slate. The vein is an easterly split-off from the main Mother Lode. Ore shows quite an amount of galena and silver. An incline shaft 200 feet deep is sunk on the vein. A 16 h.p. gasoline single-drum hoist on property.

Mill: 9″ x 15″ Blake crusher, 10 stamps, 1000 pounds each; two 4-foot Tullock concentrators, 80 h.p. boiler, 50 h.p. steam engine furnishes the power to drive mill. Idle. L. R. Tullock, Mrs. D. Bisbee et al., of Angels, owners.

Union and Burgess Group of Mines (quartz). See our Reports VIII, p. 147; X, p. 63. They are located 3 miles southeast of San Andreas, on ridge east of South Fork of Calaveras River. Control the following claims: Ambrosia, Burgess, Pedro, and Union, consisting of 99 acres. Property was mined through a shaft 455 feet deep on Union claim, and vein developed on 120-foot level, 335 feet N., 150 feet S. On 160-foot level, 60 feet N.; 220-foot level 50 feet S. On 290-foot level 240 feet N.; 350-foot level 330 feet N. On Burgess claim by two shafts, No. 1 shaft 140 feet in depth, No. 2 shaft 220 feet in depth. Strike of vein is N. 47° W., with a dip of 70° NE. Shafts on Union and Burgess caved. Idle. Albert Guttinger, of San Andreas, owner.

Utica Mine (quartz). (See Reports VI, Part II, p. 28; VIII, pp. 122–124; X, p. 150; XII, p. 98, M. and S. P., November 26, 1904.) This property is located at Angels at an elevation of 1450 feet. Includes nine claims as follows: Utica, Stickles, Raspberry, Brown, Washington, Dead Horse, Jackson, Confidence and Little Nugget. The mine is located on what is called the Dead Horse lead, which has a strike of northwest and southeast, dipping 70° NE. The vein shows an average width of 60 feet of ore with an average value of $3.60 per ton. Work has been opened up through two vertical shafts, main working shaft being the Cross shaft with a depth of 1470 feet; 1100 feet north of Cross shaft on 1400-foot level winze 700 feet deep to 2100-foot level;

1600-foot crosscut from 1500-foot level connects Utica workings with Gold Cliff workings on 2400-foot level. The Stickles shaft, which has a depth of 1000 feet, is used only for lowering timbers; also as an emergency pumping shaft. The water is handled from this shaft by a 6-inch 6-stage centrifugal pump, driven by 200 h.p. motor. There are over 100 miles of underground workings on this property. The ore is hoisted through Cross shaft (3-compartment, 7′ x 16′ in the clear) in 4-ton skips by a 600 h.p. double conical drum hoist run by water power, and dumped at the head of shaft over a grizzly of 3″ round iron bars. 10′ long, placed 1¾″ apart and set at an inclination of 40°. At lower end of grizzly the rock passes to 10″ x 26″ Sturtevant crusher. The crusher and grizzly are set over a 50-ton bin from which the ore is conveyed to mill by electric tram to 200-ton capacity bins. Mining and development are carried on with air drills, air supplied by three compressors, one run by water power, and two by electric power, including a new Laidlaw-Dunn-Gordon (size 22″ x 24″, 14″ x 24″) 2-stage compressor. Water is hoisted out of this shaft by water skip of 1500 gallons capacity.



Headframe at Cross shaft, Utica Mining Company, Angels Camp, Calaveras County, California. Photo by W. W. Bradley.

Utica Mill: 60 stamps, weighing 1000 pounds per stamp, dropping 7 inches at 104 drops per minute and crushing 5 tons per stamp through No. 1 punched screen. Pulp concentrated on thirty-six 4-foot Frue vanners. Mill is driven by 150 h.p. motor. Power furnished by Union Water Company, which is controlled by Utica Mining Company, at a cost of $2 per h.p. An extraction of 85% is made in amalgamation and concentration with a loss in tailings of 25 cents per ton. The method of mining is by square set and fill on upper levels, but the management proposes to use the open stope and pillar system on lower levels. Total operating costs are $2.15 per ton. Timbers cost $2.30 per stick and lumber $18 per thousand. One hundred and fifty-five men are employed. Utica Gold Mining Company, Hayward; Hobart and Lane Estates, Merchants' Exchange Building, San Francisco, Cal., owners. F. J. Martin, general manager.

Voinich Mine (quartz). It is located 6 miles south of Angels and controls the following claims: Delmascia, Dubovanic, and Fields homestead, a total of 90 acres. Vein lies in black slate, and strikes north and south, with a dip of 60° E. Three-compartment incline shaft sunk on vein. Equipment consists of a double-drum steam hoist, 12 drill Rand compressor, two 80 h.p. horizontal boilers. Property idle. Voinich Gold Mining Company, of Stockton, owners.

Washington Mine (quartz). It is 4 miles north of Murphy, on ridge between Indian and San Antonio creeks. Strike of vein is N. 35° E., dip 85° S., 12 inches wide. Crosscut tunnel 1200 feet long. Character of ore is base, containing galena, zinc blende and pyrite. Walter Oslin, of Sheep Ranch, owner.

Water Lily Mine (quartz). (See our Reports VIII, p. 141; XII, p. 90.) Located 1½ miles east of West Point, on south slope of Valentine Hill. Two parallel veins on property in granite formation. Two shafts sunk on veins, depths 230 feet and 125 feet, caved at collar. Idle. W. T. Sessnon, B. F. Porter, of San Francisco, owners.

The Waterman Mine (quartz). It is 1 mile west of Angels. Controls one claim called Waterman (600 feet by 1500 feet). The vein on this property strikes northwest and southeast, and dips 50° NE. This vein has been prospected by a series of diamond drill holes to the depth of 1000 feet. A concrete foundation around collar of shaft has been laid and it is planned to install a steel gallows frame. Company planning to sink a shaft to depth of 1000 feet. Waterman Mining Company, owners. T. A. Coons, of Lordsburg, president; H. A. Coons, superintendent.

Wheelock Mine (quartz). It is 2 miles southwest of Sheep Ranch, on ridge between San Antonio and Indian creeks. Vein 4 feet wide, strike northwest and southeast, dip 80° NE. Vein highly impregnated with iron pyrites and containing free gold. There are three tunnels on the vein, upper, middle and lower, lengths being 100, 180, 300 feet. The lower tunnel gives 600 feet of backs. Edward Latora, Chas. Latora, of Sheep Ranch, owners.

Whittel Mine (quartz). Located 4 miles south of Angels, near Carson Creek; shaft caved and machinery removed. Frank Solinsky, John Reddick, of San Francisco, owners.

Wide Awake Mine (quartz). It is 5 miles southwest of Railroad Flat, on ridge south of Esperanza Creek, on east and west vein, dip 85° N. Wide Awake shaft 100 feet deep. Shady Side shaft 100 feet in depth. Five-stamp mill on property. Idle. Geo. I. Wright, of Railroad Flat, owner.

Wilbur Womble Mine (quartz). Situated near the town of Hodson, on ridge northwest of Little John Creek. The vein on this property is in the form of a stringer ore deposit, consisting of a mass of quartz stringers cutting the schists, accompanied by a massive outcropping of quartz, which is more or less barren, the values being in the quartz stringers cutting the schists. The ore zone is from 50 to 100 feet in width, strike of vein being N. 40° W., with a dip of 35° NE. The footwall of vein is a black slate and the hanging-wall a hard diabase. There is a soft black slate gouge on footwall. Developments consist of an incline shaft 185 feet in depth. On 160-foot level there is a drift 200 feet north and 250 feet south. Pay shoot developed has a length of 450 feet with a width of 50 feet. Ore averages \$3 per ton in free gold with 2% pyrite. Sulphurets assay \$30 per ton.

Hoist and mill of Wilbur Womble Mine, Hodson, Calaveras County, California.

Mine equipment: 25 h.p. single-drum hoist, 12″ x 9″ x 12″ Laidlaw-Dunn-Gordon compressor driven by 75 h.p. motor.

Mill: No. 2 Gates gyratory crusher; 15-stamp Merrill mill, stamps weigh 1000 pounds, 5 Standard concentrators, 3 Gates vanners. Mill driven by 40 h.p. motor. Eight men employed. Property being reopened by present company. Hodson Mining Company, Frank Brown, president, W. R. Womble, secretary, Milton, owners.

Wolverine Mine (quartz). It is 4 miles northwest of Railroad Flat. Shaft 400 feet deep, caved. Idle. Edwin Taylor Estate, of Railroad Flat, owners.

Woodhouse Mine (quartz). Situated 4 miles southwest of West Point, on ridge between the Middle and South forks of the Mokelumne River. Shaft 175 feet deep. Tunnel 150 feet in length. Idle. Walter P. Hill, of San Francisco, owner.

GOLD MINES—PLACER. (Drift and Hydraulic.)

The ancient channel system of Calaveras has been extensively discussed in our Report XII, pp. 482–492, also in Professional Paper No. 73, published by the U. S. Geological Survey, ''The Tertiary Gravels of the Sierra Nevada of California.'' On the Mokelumne Hill system of channels on Stockton ridge near Mokolumne Hill, active operations are being carried on in opening up old and new properties, and the prospects look bright for a heavy production of gold from this famous old camp. In the neighborhood of Railroad Flat there are several properties operating on the Fort Mountain channel.

Hydraulic operations have been resumed by the Moosehead Water Power and Mining Company at Calaveritas and Cave City. In the San Andreas district a number of drift mines are being reopened and the results obtained have been very encouraging.

The prospects look very bright for an increased activity in gravel mining in this county, owing to the increase in the water supply due to the abundant rains during the past year.

Avalanche Placer Mine (hydraulic). It is 2 miles east of Vallecito, on Table Mountain channel. Idle. Thos. Cox Estate, of Stockton, owner. Thomas Cox, of Stockton, agent.

Big Bend Placer (*Banner Blue Gravel*) *Mine* (drift). Five miles northeast of Mountain Ranch, on Jesus Maria Creek. On Fort Mountain channel. Two tunnels on channel, one 360 feet, the other 380 feet in length. Two shafts to bedrock 62′ and 68′, depths. Two men employed. W. B. Swank, E. R. Trammal, of Oakland, owners. W. B. Swank, of Mountain Ranch, agent.

Boire Placer Mine (drift). Located ½ mile north of Railroad Flat, on Fort Mountain channel. Course of channel north and south, width of pay gravel 40 to 60 feet, with an average depth of 5 feet. Channel developed by two bedrock tunnels, 400 feet and 600 feet in length, an extensive area has been breasted. Bedrock is a soft mica schist. The gravel is slightly cemented. The gravel is disintegrated in a Cox pan and washed in sluice boxes. Amount of gravel handled, 120 tons per twenty-four hours. Property worked only when water is plentiful. Four men are employed. F. W. Boire and C. A. Boire, of Railroad Flat, owners.

Boyd Placer Mine (drift). It is 1½ miles east of Vallecito, on Murphy Gulch channel. Idle. James Clark, Thomas Kennedy, of Stockton, owners.

Buffalo Mine (drift). It is 2 miles south of Mokelumne Hill, on Chili Gulch. Deep Blue Lead channel. Controls the following claims: Buffalo Placer Mine, Hughes & Sons Deeper Gravel, Seigel, Reed, Bornhart, total of 160 acres. Course of channel is north and south. Shaft 250 feet deep to slate bedrock. Channel capped by basalt 100 feet thick. Idle. D. M. Riordan, of New York City, owner.

Calaveritas Placer Mine (hydraulic). It is located ¼ of a mile southeast of Calaveritas on Calaveritas Hill, between San Antonio and Calaveritas creeks. Water supply from Table Mountain Hydraulic Mine, also 18 miles of 1000-inch ditch from McKinneys and O'Neils creeks; 3 miles 18-inch and 22-inch pipe line with a head of 200 feet. Bank of gravel 1500 feet long, 135 feet high, reported to average 20 cents per cubic yard. Equipment, besides hydraulic pipe and giants, are: 10-stamp mill and Price rotary mill. Twenty men employed. A. Baldwin and L. Baldwin, 21 Pine street, New York City, owners. E. C. Rigney, manager.

Carpenter Mine (drift). It is located 2 miles southwest of Mokelumne Hill, on Chili Gulch Deep Blue Lead channel. Work being carried on through shaft 150 feet deep. Gravel hoisted with 15 h.p. single-drum electric hoist, crushed in an 8-stamp mill, weighing 850 pounds per stamp. Eleven men employed. W. H. Brewster, of Mokelumne Hill, owner.

Cataract and Wide Awake Gravel Mine (hydraulic). Five miles southeast of Murphy, on Central Hill channel. Course north and south. H. W. B. Lake, of Oakland, owner.

Central Hill Hydraulic Mine (hydraulic and drift). (See Report XII, pages 91 and 482.) At Douglas Flat, on Central Hill channel. A drain tunnel 2400 feet long was driven into the Central Hill mine through 900 feet of lava cap and 1500 feet of slate bedrock. Width of pay gravel was 30 to 100 feet, with a depth of 5 feet. This mine was formerly worked by hydraulic method. Idle. William H. Thomas, of Douglas Flat, owner.

Chapman Gravel Mine (drift). One mile south of San Andreas, on the central Hill channel. Controls 163 acres. The channel has been developed by four shafts sunk to bedrock: Boman shaft 165 feet, Chapman 185 feet, Marshall No. 1 shaft 200 feet, Marshall No. 2 shaft 100 feet, all sunk along the course of the channel. These shafts showed that the gravel was capped by a breccia of basaltic and andesitic pebbles 30 feet in thickness.

Equipment consists at Chapman shaft of a 15 h.p. electric hoist 10″ x 10″ Ingersoll-Rand compressor, 6-inch Neilson double action geared pump driven by 15 h.p. motor. G. D. Clark, 116 Natoma street, San Francisco, I. N. Chapman, Alameda, owners.

Chispa Gravel Mine (drift). Two miles north of Murphy, on ridge between San Domingo and Indian creeks. Controls 357 acres. Shaft to bedrock 52 feet deep. Two tunnels on rim of channel, one 50 feet long, other 100 feet in length. Seven mile ditch conveys water to property from San Domingo Creek. Property idle on account of shortage of water. F. A. Mitchler, of Murphy, O. D. Harrington, of Sonora, Tuolumne County, owners.

Clover Leaf Placer Mine (drift). It is 1 mile south of Mokelumne Hill, on west slope of Stockton Ridge. The work is carried on through a tunnel 1800 feet in length at an elevation of 1350 feet. The channel on property is called the Stockton Ridge channel, which was reported very rich. Four men are employed driving tunnel for channel. The holdings consist of 83 acres. Chas. H. Wilson, owner, 513 Bartlett street, San Francisco. L. M. Ludovici, superintendent.

Coffee Mill Mine (drift). It is 4 miles south of Mokelumne Hill, on the east slope of Golden Gate Mountain, and is on Kraemer channel. Tunnel 900 feet in length, being retimbered. Five men employed. Edward Stocker, of Fosteria, owner.

Corral Flat Mine (drift). It is 1 mile southwest of Mokelumne Hill, on northwest slope of Stockton Ridge, located on Corral Flat channel. The holdings amount to 40 acres. At an elevation of 1260 feet the channel is developed by a tunnel 1800 feet in length driven in rhyolite capping. Course of this channel is northeast and southwest. The channel has been prospected by numerous winzes sunk from tunnel level to bedrock, as the tunnel is in lava about 60 feet above the bedrock. Four men are employed retimbering and cleaning out old workings. Corral Flat Mining Company, Rialto Building, San Francisco, owner. Edward Johnson, superintendent.

Cultus Placer Mine (drift). It is 1 mile northeast of Railroad Flat, on Fort Mountain channel. Two bedrock tunnels, 225 feet and 285 feet in length. Idle. J. T. Jones, of Railroad Flat, owner.

Duck Bar Placer Mine (river bar). It is 6 miles northeast of Vallecito, on the North Fork of Stanislaus River, consists of three claims on the river, named, Duck Bar, Wild Goose, and Enterprise, controlling 80 acres. Working the bar of the river by turning the course of the stream, operations being carried on during the summer months only. Ten men are employed. Duck Bar Placer Mining Company, Stockton, owner. E. Madison, superintendent.

Duryea Placer Mine (drift). It is 2 miles south of Mokelumne Hill, on Duryea channel. Controls 130 acres. Channel developed by two tunnels, Duryea tunnel 2000 feet long and Safe Deposit tunnel 700 feet in length. Course of channel northeast and southwest, thickness of basalt capping being 100 feet. Width of channel is from 80 to 100 feet, depth of gravel being 50 to 100 feet. Extensively hydraulicked in past years. Idle. T. C. McSorley, of Mokelumne Hill, owner.

Eastland-Gray Development Company (drift and hydraulic). It is located 3 miles north of San Andreas, on the North Fork of the Calaveras River. Previous method of working gravel was in sluicing off the overburden and handling the gravel in limestone crevices by means of a Brown bucket hoist. The gravel occurs in crevices on contact between schists and limestone, the strike of the schists and limestone being N. 40° W. A parallel series of porphyry dikes cuts diagonally across schists and limestone. The boulders are in the form of rhyolite, andesite and quartzite, with a small amount of quartz boulders. Some are rounded, others subangular.

Equipment consists of 3 miles of ditch, 2000 feet of 10-inch and 16-inch pipe line under 250-foot head. Treatment consists in elevating material by Brown hoist of $1\frac{1}{2}$ cubic yards capacity per bucket to Gates revolving screen, which will treat 1000 cubic yards of gravel per twenty-four hours. This property has been under operation from 1905 to 1912, during which time $80,000 has been extracted. Two men employed in prospecting crevices. Eastland-Gray Development Company, owner, 501 Grant Building, San Francisco.

Eclipse Placer (*Infernal*) *Mine* (drift). (See Report XIII, page 109.) It is $3\frac{1}{2}$ miles southeast of Mokelumne Hill, on Tunnel Ridge channel. Elevation 1210 feet. Course of channel is north and south. Work carried on through a tunnel 225 feet in length, width of channel is 100 feet, depth of gravel 4 to 6 feet. Channel capped with basalt flow. Four men employed. Roger Johnson, owner, 645 Mills Building, San Francisco.

Emery Group of Mines (hydraulic). One mile south of El Dorado. Controls the following claims: Humboldt, Rose Hill, Perano, Valley Land, Bradford, Pasche & Bush placer mines; total of 510 acres on El Dorado channel. Controls water rights on Jesus Maria and Little Mokelumne creeks. Twenty miles of ditch from Jesus Maria Creek, 16,000 feet of 16-inch to 30-inch pipe line. Idle. Emery Gold Mining Company, Bradford, McKean County, Pa., owners. Louis Emery, president.

Eureka Placer Mine (drift). Located $\frac{1}{2}$ mile north of Railroad Flat. West tunnel 800 feet, east tunnel 300 feet. Two men employed. J. L. Miller, of Railroad Flat, owner.

Fairview Placer Mine (drift). It is 2 miles east of Vallecito, on Cataract channel. Tunnel 300 feet long and shaft 100 feet deep. Idle. Luke Sanguinetti, Albert Sletten et al., of Vallecito, owners.

Fine Gold Placer Mine (drift). It is 2 miles southeast of Vallecito, on the Cataract channel. Tunnel 300 feet long. Four men are employed. Alvin Lundberg, of Stockton, owner. Luke Sanguinetti, superintendent.

Forty-nine Placer Mine (drift). At Douglas Flat on Coyote Creek. located on Central Hill channel. The work was carried on through shaft 185 feet deep, sunk to bedrock. From this shaft 2000 feet of drifting along channel to north and south has been done. Equipment consists of two 80 h.p. boilers, double-drum hoist driven by water power; 4500 feet of 4-inch pipe. Idle. Forty-nine Gold Placer Mining Company, owners. J. M. Evans, of Douglas Flat, agent.

Gaston Hill Placer Mine (hydraulic). Two miles south of Mountain Ranch, on Gaston Hill, on El Dorado channel. Bartola Solara and Guiseppe Cuneo, of El Dorado, owners.

Green Mountain (*McSorley*) *Mine* (drift and hydraulic). It is 1¾ miles southeast of Mokelumne Hill, on Tunnel Ridge channel. Controls the following claims: Green Mountain, Green Mountain Extension, Green Mountain East Extension, Chili Gulch, Boucher & Bracket (all patented); total holdings of 220 acres. Course of channel northeast and southwest. Width of channel 100 to 200 feet. Depth of gravel 6 to 12 feet. Main tunnel 1800 feet in length, series of tunnels of different lengths on channel and also some large hydraulic pits on property. This mine also noted for large quartz crystals found, and sold for gem purposes. Idle. J. S. Bogle, 518 California Building, Tacoma, Wash., owner.

Hartman Mine (drift). It is 3 miles southeast of Mokelumne Hill, on Old Woman's Gulch channel, course of channel northeast and southwest, width of channel 50 feet, with a depth of gravel of 4 to 6 feet. Gravel was worked through two shafts 50 feet in depth to slate bedrock. Idle. Owner, Mrs. John Myers, 613 Sutter street, Stockton, Cal.

Hedrick Placer Mine (drift and hydraulic). It is 2 miles south of San Andreas, on Central Hill channel. Developed by bedrock tunnel 400 feet long and shaft 118 feet deep. There are five shafts sunk on the property along the course of the channel, depths of 50 to 120 feet. Three tunnels 400 feet long, 150 feet in slate bedrock and 250 feet in cemented gravel. The gravel is 60 feet deep, capped with a breccia of andesitic and rhyolitic pebbles. Two men employed. George Hedrick, of San Andreas, owner.

Hexter Placer Mine (drift). It is 1½ miles southwest of Mokelumne Hill, on northwest slope of Stockton Ridge, and consists of 338 acres.

At an elevation of 1225 feet, a tunnel 2000 feet in length has been driven in the diorite bedrock underneath the rhyolitic and andesitic capping that forms the crest of Stockton Ridge. The channel developed is called the Duryea channel, which has been drifted on 500 feet north and 500 feet south. The gravel developed shows a width of 150 feet and 7 feet in depth of pay gravel. It is only slightly cemented and is easily treated in a Price rotary mill which will handle 250 tons in twenty-four hours. The gold is amalgamated in 70 feet of sluice boxes containing Hungarian riffles. The black sands are concentrated on a No. 4 Deister table. Six to thirty men are employed. Owners, Stockton Ridge Consolidated Mining Company, Hearst Building, San Francisco, Cal. S. Hughes, manager.

I X L Placer Mine (drift). Five miles northeast of El Dorado, on Fort Mountain channel. Sinking incline shaft on rim of channel. Four men employed. J. J. McIntire, Miles Standish, 255 California street, San Francisco, Cal., owners.

Johnny Jumper Placer Mine (drift). It is ½ mile north of Railroad Flat, on ridge southeast of Spruce Gulch, on Fort Mountain channel. Bedrock tunnel 600 feet in length, shaft 100 feet in depth. Idle. J. Lester, P. Lester, of Railroad Flat, owners.

Lloyd Gravel Mine. It is located 5 miles northwest of San Andreas, on Deep Blue Lead channel. Controls 110 acres. The channel was developed by three vertical shafts, 90 feet, 117 feet and 210 feet deep, all sunk to bedrock; also an incline shaft 300 feet deep sunk on the rim. Idle. Heath & Co., Boston, Mass., owners.

Manitou Placer Mine (drift). It is 1 mile northwest of Vallecito, on Central Hill channel. Idle. T. M. Edwards, of Vallecito, owner.

McCann Placer Mine (drift). It is 3 miles south of Mokelumne Hill, on Tunnel Ridge channel. Tunnel 1200 feet in length. Idle. Frank Peek, of Mokelumne Hill, owner.

Mead Mine (drift). Located 3 miles southeast of Mokelumne Hill, on Old Woman's Gulch channel. Shaft 50 feet deep, 8-stamp mill, 850-pound stamps. Idle. W. C. Mead, 730 Jefferson street, Stockton, Cal., owner.

Missouri and Dolly Varden Mine (drift). Located at Douglas Flat, on Coyote Creek, on Central Hill channel. Shaft sunk on channel 92 feet to bedrock. The gravel was treated in a revolving screen, size ¼-inch, oversize going to sluice boxes, the fines going to 4 Hancock jigs where black sands and fine gold were saved. Idle. California Extraction Company, 748-750 Mills Building, San Francisco, Cal., owners.

Mutt Placer Mine (creek bar). One mile west of Sheep Ranch, on O'Neils Creek. Idle. Fred Willie, of Sheep Ranch, owner.

Noce Placer Mine (hydraulic and drift). It is 5 miles east of Mokelumne Hill, on Whiskey Slide Hill. Worked only during rainy season. John Noce, of Whiskey Slide, owner.

North Hill, South Hill, Whiskey Hill, Bunker Hill, Sand Hill, Placer Mines (hydraulic). Located 3 miles east of Jenny Lind. Have been extensively hydraulicked. Idle. California Company, 115 Broadway, New York City, owners.

North Star Placer Mine (drift). It is 2½ miles south of Mokelumne Hill, on Old Woman's Gulch channel. Controls the following claims: Empire, McDonough, New Combination, Three Ball, Empire No. 2, Shuman, McGuire and Bondie, with a total of 600 acres. On Old Woman's Gulch channel. General course of channel is north and south, with width of channel developed 80 to 200 feet, and a depth of gravel of 6 to 10 feet. Channel capped by basalt. Work was carried on through 2800-foot bedrock tunnel and there is over one mile of workings on the channel. Bedrock is a decomposed granodiorite and slate. Idle. North Star Mining and Development Company (Gustave Bowman, president; Thomas Applegarth, secretary), Holland House, New York City; L. Everett, of Mokelumne Hill, agent.

North Star Placer Mine (drift). It is ¾ mile east of Altaville, on Central Hill channel. The channel has been developed by a tunnel 800 feet in length. Property idle 1914 on account of shortage of water. Norman Smith, James Bennett et al., of Angels, owners.

O'Connell Blue Gravel Mine (drift). Two miles southeast of San Andreas, on Central Hill channel. Shaft 56 feet deep. O'Connell Bros., of San Andreas, owners.

Paragon Placer Mine (drift). It is 2½ miles east of Angels, on Central Hill channel. Controls 140 acres. Work was carried on by tunnel 1490 feet in length, driven 600 feet in slate bedrock, remaining distance in loose gravel. Width of pay gravel developed 200 feet, with a depth of 3 feet. Property closed down on account of litigation over ownership. Hutchinson & Co., of Angels, owners.

Ranier Mine (drift). Located 1 mile north of Angels, on Central Hill channel. Controls four placer claims: Hecla, Aetna, Vesuvius and Alta, containing a total of 400 acres. Property has been developed by shaft 325 feet deep, from which shaft 1000 feet of drifting was done along the channel. Channel is lava capped by rhyolite tuff, 60 to 240 feet in thickness. Character of gravel loose and cemented. Equipment on property consists of a new 60-foot head frame, electric double drum hoist, driven by 160 h.p. motor; 15-drill compressor, driven by 50 h.p. motor. Mine shut-down on account of heavy flow of water struck in lower levels. J. A. Perano et al., of Angels, owners.

Reed Gravel Mine (drift). It is located 5 miles northwest of San Andreas, on Latimer Gulch, on the Deep Blue Lead channel. Controls 157 acres. Course of channel is north and south. The channel is developed by incline shaft sunk on the rim of bedrock at angle of 20° to a depth of 616 feet. A drain tunnel 2000 feet in length taps the incline shaft, draining workings. Channel drifted on 500 feet to north and 450 feet to the south. Reported $80,000 taken out of this mine. Equipment consists of 20 h.p. boiler, 4-stamp mill, weight of stamps being 750 pounds. Workings caved. Idle. J. J. Hicky and Chas. Lamb, of Lodi, Cal., owners.

Rising Star (*Casinelli*) *Placer Mine.* It is 5 miles northwest of San Andreas, on Deep Blue Lead channel. Controls 58 acres. Course of channel is north and south. Channel developed by tunnel 1800 feet in length, connected with a shaft 150 feet below surface, 900 feet from tunnel entrance. Channel is capped by a breccia of andesitic and rhyolitic pebbles, from 20 to 150 feet in thickness. The width of pay gravel is 100 feet, with an average depth of 4 feet. Method of treatment is as follows: The gravel is first allowed to slack, then run through concrete mixer with grizzly bars set $\frac{1}{8}$-inch apart, driven by 6 h.p. gasoline engine, capacity of mill 400 tons per twenty-four hours. The gravel washed in sluice boxes containing Hungarian riffles. Gravel from workings is hauled to bin in six 1600-pound capacity cars by 20 h.p. 4-cylinder gasoline engine. Two men employed in straightening out main tunnel, with the idea of resuming operations when the water supply is increased by the rains. Ancient River Corporation, 60 State street, Boston, Mass., owners. J. O. Whitney, manager.

Rooney Gravel Mine (drift). Located 3 miles south of Mokelumne Hill, on Chili Gulch, Deep Blue Lead channel. Course of channel northeast and southwest, width 80 to 100 feet, depth of gravel 4 to 6 feet. Vertical shaft 150 feet deep. Single-drum hoist. Five-stamp mill on property. Idle. T. H. Rooney Estate, of San Francisco, Cal., owners.

Roosevelt Placer Mine (drift). It is $2\frac{1}{2}$ miles east of Angels, on Central Hill channel. Developed by shaft 60 feet deep to bedrock, and channel being drifted on. Six men employed. Morris Val, of Angels, owner.

Rough Diamond Placer Mine (drift). It is 3 miles south of Mokelumne Hill, on Tunnel Ridge channel. Tunnel 700 feet in length. Justinian Caire Company, 573 Market street, San Francisco, Cal., owners.

Rough Diamond Placer Mine (drift). It is situated $4\frac{1}{2}$ miles east of Angels, on the Central Hill channel. Controls 40 acres. Three men employed. L. J. Hutchinson, David Oard, of Angels, owners.

Square Head Placer Mine (drift). It is 2 miles south of San Andreas, on the Central Hill channel. The channel is capped with a breccia of basaltic and andesitic pebbles, which on this property is 20 feet thick. Tunnel driven in bedrock of slate for 450 feet and 100 feet in blue cemented gravel; width of pay gravel mined was 150 feet wide, with a depth of 7 feet. Shaft 93 feet deep connects with tunnel. Width of channel on this property from rim to rim is 280 feet, depth of gravel being 63 feet. Idle. M. J. Hertzig, of San Andreas, owner.

Stockton Hill Mine (drift). It is in the townsite of Mokelumne Hill, on the northeast slope of Stockton Ridge. Work being carried on through a shaft 160 feet deep. Mrs. A. C. Nuner and G. W. Pfortner, Mokelumne Hill, owners.

Table Mountain Placer Mine (hydraulic). It is 2 miles west of Sheep Ranch, on ridges between San Antonio, O'Neils and McKinley creeks. Controls 2500 acres. On Fort Mountain and El Dorado channels. Water supply from O'Neils and San Antonio creeks. There are 58 miles of 1100-inch ditch and two miles of 10-inch pipe line, which supply water to giants under a head of 210 feet.

Width of pay gravel 1000 feet with a depth of 20 feet. Gravel will average about 25 cents per cubic yard. Tailings are stored by series of brush dams, also by a cement dam 22 feet high and 460 feet long. Eight men are employed. Moose Head Water Power and Mining Company, A. Baldwin, L. Baldwin, of New York City, owners; E. C. Rigney, manager, 21 Pine street, New York City.

Table Mountain Placer Mine (drift). It is 4 miles south of Vallecito, on Table Mountain, located on Cataract channel. Course of channel north and south. Incline shaft 130 feet deep, and 110 feet of drift from incline in hard granodiorite bedrock. Four men are employed drifting in bedrock to get below channel. Table Mountain Consolidated Mining Company, Merchants' National Bank Building, San Francisco, Cal., owners. C. E. Montgomery, superintendent.

Table Rock Gravel Mine (drift). It is 3 miles northeast of Sheep Ranch, on west slope of Table Rock Mountain. Tunnel 2200 feet long under lava cap. Workings caved. Idle. J. J. Fischer, W. C. Armstrong et al., of Sheep Ranch, owners.

Texas Placer Mine (drift). At Douglas Flat, adjoins the Forty-Nine Placer Mine. Shaft 90 feet deep. Manuel Estate Company, of Murphy, Cal., owners. Mathew Manuel, of Murphy, agent.

Union Shaft Mine (drift). It is 4 miles northwest of San Andreas, on Central Hill and Deep Blue Lead channels. Two shafts 100 and 150 feet in depth are sunk on channel. The course of channel is north and south. Workings caved. Judge I. H. Reed, of San Andreas, owner.

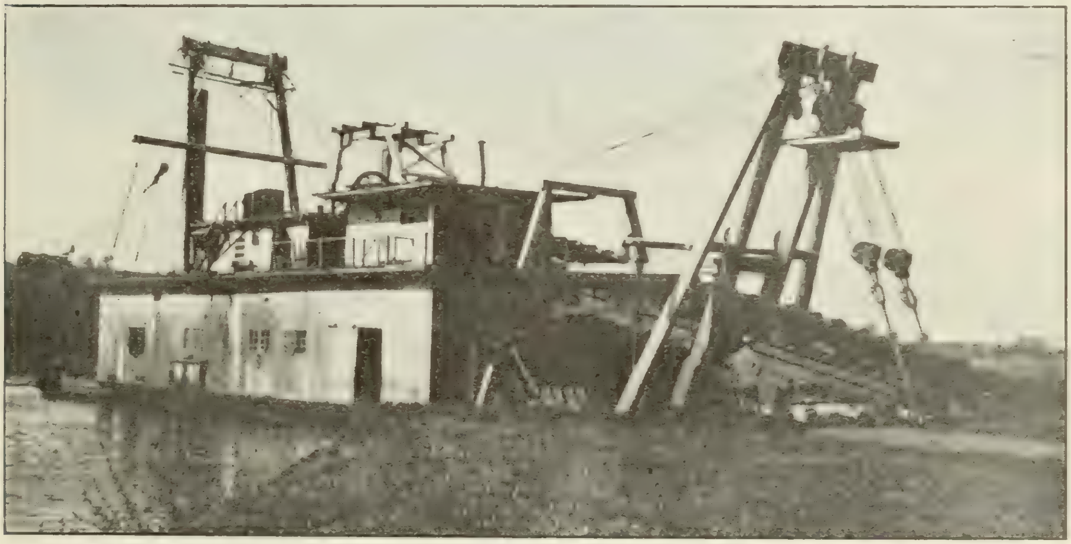
Vallecito Gold Mining Company (drift). (See our XII Report, pages 99, 482.) Located in the townsite of Vallecito, on Central Hill channel. Controls four claims: Bonney, Bowling Green, Dashaway, Ruby. Two shafts on property, 110 and 50 feet deep. Thomas Bishop Estate, of San Francisco, Cal., owners.

Viola Placer Mine (hydraulic and drift). It is ¼ of a mile northwest of Douglas Flat, on Central Hill channel. Tunnel 700 feet in length, 400 feet in slate bedrock, the remaining distance in gravel. F. Orth, Edward Prathero et al., of Douglas Flat, owner.

West Lake Mine (drift). It is 3 miles southwest of Mokelumne Hill, on Chili Gulch Deep Blue Lead. Course of channel north and south. Shaft 150 feet deep. J. A. Porter, of Los Angeles, owner.

Wet Gulch Placer Mine (hydraulic and drift). It is 7 miles east of Mokelumne Hill, on Wet Gulch. Two men employed. F. C. Gnecco, L. Gnecco, of Wet Gulch, owners.

What Cheer Mine (drift). It is 3 miles southwest of Mokelumne Hill, on Chili Gulch Deep Blue Lead channel. Controls 140 acres. Incline shaft 900 feet deep. Vertical shaft 250 feet deep. Width of channel 80 to 150 feet, depth of gravel developed 6 to 8 feet. Channel capped with basalt 100 feet in thickness. Course of channel northeast and southwest. Idle. John A. Landers, Russ Building, San Francisco, Cal., owner.



Calaveras Dredge No. 1, Calaveras Gold Dredging Company, Jenny Lind District, Calaveras County, California. Five cubic-foot close-connected type of dredge.

GOLD DREDGING.

Gold dredging operations have been carried on steadily in Calaveras County since 1903, in two localities. Near Jenny Lind on the Calaveras River, there are three dredges being worked by the following companies: The Calaveras Gold Dredging Company, Butte Dredging Company and Isabel Gold Dredging Company. The Oro Light and Power

Company is operating a dredge near Camanche on the Mokelumne River. The high cost of operations in these districts is due to the heavy bank of clay and cement gravel encountered.

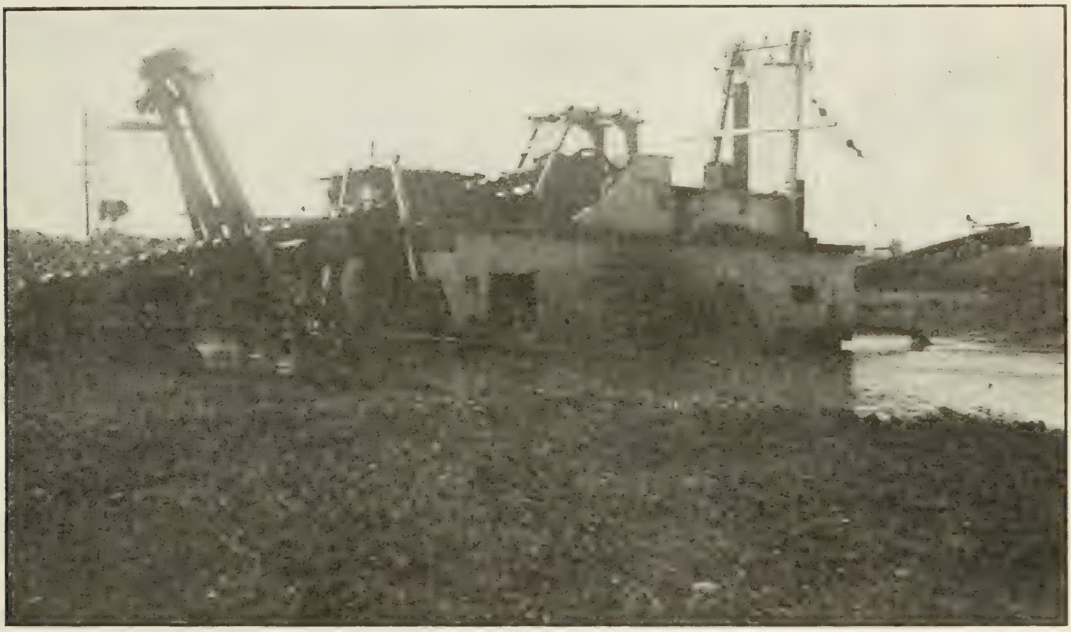
Calaveras Gold Dredging Company. The Calaveras Gold Dredging Company began operations in 1903. The holdings of this company comprise an area of 250 acres located in T. 3 N., R. 10 E., along the Calaveras River near Jenny Lind. The average depth of ground is 20 feet, the gravel being coarse and overlain by hydraulic tailings, also an overburden of clay and loam. In places cemented gravel has been encountered, but as a rule the gravel is loose and free, lying on a bedrock of soft clay. The dredge was constructed by the Western Engineering and Construction Company, and is equipped with Bucyrus machinery. The hull is 96 feet long and 40 feet wide, draft 4 feet 6 inches. The dredging ladder is of plate girder construction carrying seventy-eight 5-cubic foot buckets (weight 1250 pounds). The tailings stacker is a Robins belt conveyer 96 feet long carrying a 30-inch belt. The electric motor equipment installed on the dredge has a rated capacity of 234 h.p., distributed as follows:

Calaveras Dredge No. 1. Calaveras Gold Dredging Company, Jenny Lind District, Calaveras County, California. Showing bow gantry and bucket-line in operation.

Main drive motor	100 h.p.
Winch motor	20 h.p.
Stacker motor	15 h.p.
Shaker motor	15 h.p.
Main pump (one 10-inch centrifugal)	50 h.p.
Hopper pump (one 3-inch centrifugal)	10 h.p.
Clean up	3 h.p.

Two 8-inch submerged horizontal pumps in hull of boat are used as emergency pumps, driven by 20 h.p. motor. All motors are Westinghouse type, 3-phase, 60-cycle, 400 volts. A single bank of gold tables with Hungarian type of riffles is used, area of sluices being 2,000 square feet. The dredging time daily is 18 hours 12 minutes. The dredging cost amounts to 6 cents per cubic yard. Twelve men are employed. Calaveras Gold Dredging Company, 807 Alaska Commercial Building, San Francisco, Cal., owner. President, S. A. Moss; secretary, A. Boynton; G. H. Shearer, superintendent.

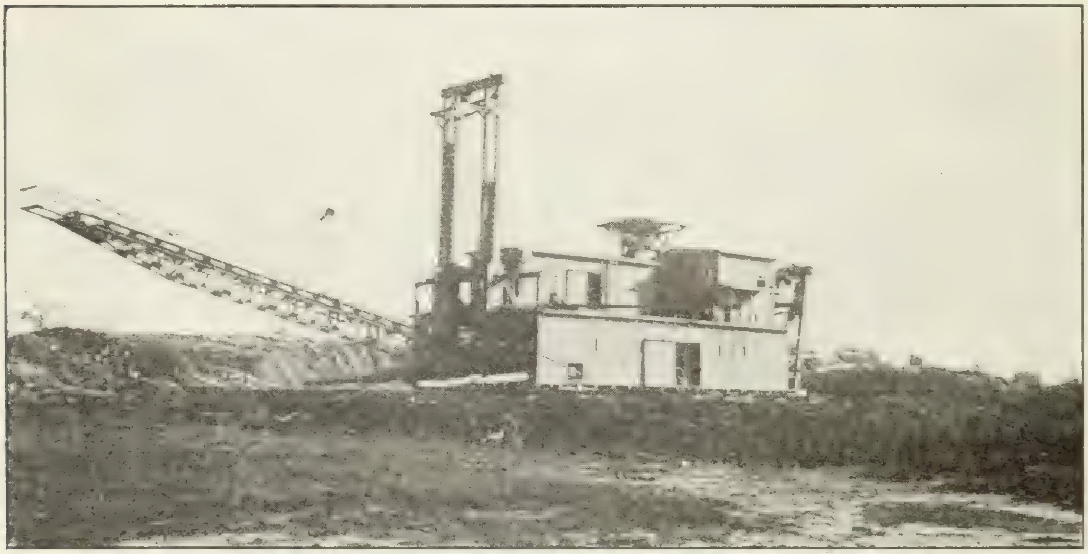
Butte Dredging Company. The Butte Dredging Company began operations in 1910. The holdings of this company comprise 200 acres, on the south side of Calaveras River, near the town of Jenny Lind. The average depth of ground is about 20 feet. The dredge is a Bucyrus type. The hull is 90 feet long and 36 feet wide, draft 4 feet 6 inches. The digging ladder carries seventy-two 4-cubic foot close connected buckets. The tailings stacker is a Robins belt conveyer 90 feet long carrying a 30-inch belt 188 feet long. The electric motor equipment as installed on the dredge has a rated capacity of 175 h.p. distributed as follows:



Calaveras Dredge No. 1, Calaveras Gold Dredging Company, Jenny Lind District, Calaveras County, California. Showing bucket-line, upper tumbler and tailings stacker.

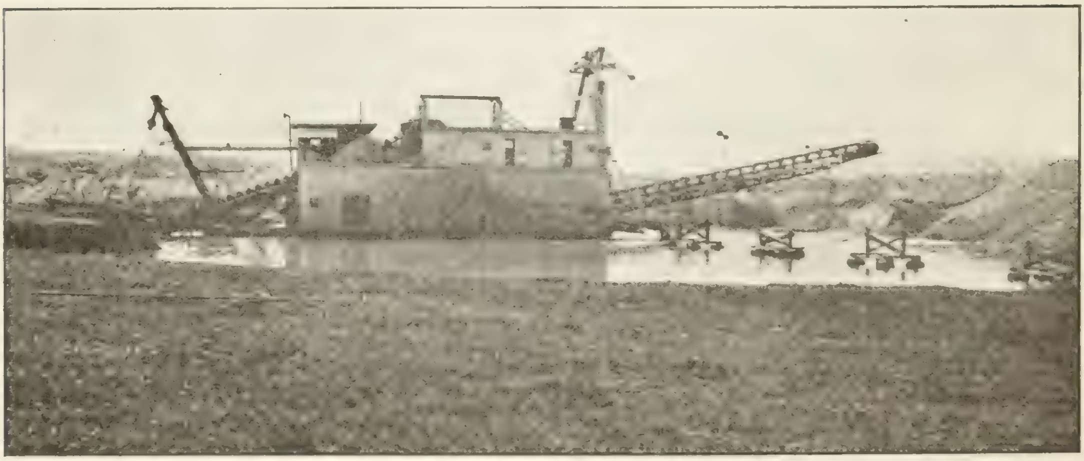
Main drive motor	50 h.p
Stacker and screen motor	30 h.p.
Main pump (8-inch centrifugal)	50 h.p.
Winch motor	20 h.p.
Pump and shop motor (2-inch centrifugal)	25 h.p.

A revolving type of screen is used, size 54″ x 30′. A single bank of gold tables with Hungarian type riffles are in use, which have a grade of 1⅛-inch to the foot. The area of sluices is about 1500 square feet. The total amount of cubic yards excavated in past twelve months was 406,513, at a cost of $.0857 per cubic yard. The high cost is due to high bedrock and heavy clay encountered. The average depth of gravel dredged was 18 feet. Ten men are employed. Butte Dredging Company, Mills Building, San Francisco, Cal. W. S. Noyes, president; B. E. Noyes, secretary; W. A. Parks, manager.



Butte Dredge of Butte Dredging Company, Jenny Lind District, Calaveras County, California. Five-cubic foot close-connected. Showing tailings stacker of Robins belt conveyer type.

Isabel Dredging Company. The Isabel Dredging Company commenced operations in 1908. The holdings of the company comprise 211 acres, on the south side of the Calaveras River, near the town of Jenny Lind. The average depth of ground is about 30 feet. The character of the gravel is coarse and overlain by clay and loam, with a bedrock of soft clay. A Bucyrus type, 5-cubic foot, close connected elevator dredge carrying 78 buckets (1250 pounds). The hull of the dredge is 100 feet



Isabel Dredge of Isabel Dredging Company, Jenny Lind District, Calaveras County, California, showing bucket-line, stacker and outside sluices.

long by 40 feet wide and draws 5 feet. The tailings stacker is a Robins belt conveyer 96 feet long carrying a 30-inch belt 202 feet in length. The electric equipment has a rated capacity of 250 h.p.

Bucket drive motor	100 h.p.
Winch motor	20 h.p.
Stacker motor	20 h.p.
Screen motor	20 h.p.
Main pump (10-inch centrifugal)	50 h.p.
Pressure pump (5-inch centrifugal)	30 h.p.
Priming pump (3-inch centrifugal)	10 h.p.

Isabel Dredge of Isabel Dredging Company, Jenny Lind District, Calaveras County, California, showing bow gantry.

Two shaker type of screens with $\frac{3}{8}$-inch apertures and a single bank of gold tables having a slope of $1\frac{1}{4}$-inch to the foot are in use on this boat. There are eight sets of sluices arranged longitudinally with the boat, 40 feet long by 3 feet wide, with one set of outside sluices on each side of the boat. Hungarian type riffles are used, the area of sluices being about 2000 square feet. The average cubic yards excavated in the last twelve months was 603,679. Water is pumped from the river to float dredge. The cost of dredging per cubic yard averages about 7 cents. Twelve men are employed. Isabel Dredging Company, 417 Montgomery street, San Francisco, Cal. I. L. Borden, president; John Williams, secretary; Fredric Estep, superintendent.

The Oro Water, Light and Power Company. This company began operations in 1904. The holdings of the company comprise an area of about 250 acres of dredging land located along the Mokelumne River in Calaveras, San Joaquin, and Amador counties, at the junction of these three counties, about three miles from the town of Wallace. The boat at present operating is a 9-cubic foot, close connected elevator dredge, the digging buckets being of the integral bottom and lip design, weighing 1600 pounds each, running 21 buckets per minute. The digging capacity of the dredge is 40 feet below water. The hull is 115 feet long and 45 feet wide and draws 9 feet. The digging ladder is 83 feet in length, having a maximum depth of 8 feet. The revolving type of screen is used, diameter 6½ feet with a length of 33 feet. The gold saving tables have a total area of 2000 square feet on a single deck and are equipped with steel lined Hungarian riffles. The table area is supplied by two 10-inch Yuba Construction Company pumps, having a capacity of 2800 gallons per minute. The transformers on dredge reduce the electric current from 4400 to 440 volts. The electric equipment has a rated capacity of 465 h.p. The main digging motor is a 200 h.p. General Electric motor. The average depth of gravel is 25 feet. The monthly capacity of dredge is 225,000 cubic yards, the average running time being 20.5 hours per day, the gold recovery being about 10 cents per cubic yard. Oro Water, Light and Power Company. J. W. Goodwin, president; W. G. Jack, secretary; C. G. Leeson, manager. Offices, 411 Sharon Building, San Francisco, Cal.

IRON.

There is a deposit of limonite 1½ miles northeast of Murphy, which has been developed to a small extent, and another deposit of the same character 7 miles southeast of Mokelumne Hill on the Bonanza Mine group of claims.

LIMESTONE.

At the Genelli Ranch, 1 mile north of Vallecito, limestone has been burned in a crude kiln for local use.

Mercer's Cave. Situated 1¼ miles northwest of Murphy, and was discovered in 1885. It occurs in the limestone belt that passes through Murphy, and consists of several large chambers which are connected by stairways and lighted by electricity. The entire cave is 362 feet long and about 150 feet wide. W. J. Mercer, of Murphy, owner.

LeClercq Limestone Quarry. Situated 7 miles northeast of Valley Springs, on ridge south of the Mokelumne River. Idle. Adolph LeClercq, of Fosteria, owner.

Markwood Limestone Quarry. It is 5 miles northeast of Valley Springs. Idle. George Markwood, of Fosteria, owner.

McNamara Limestone Quarry. It is 5 miles northeast of Valley Springs, on the McNamara Ranch. Charles McNamara, of Fosteria, owner.

Young Limestone Quarry. Situated 4 miles northeast of Valley Springs, on Young Ranch. There is an extensive deposit of limestone, having a course of N. 30° W. Formerly the owners burned the lime for local use, but of late years the quarry has been idle, except when rock was sold to the smelter at Campo Seco as a flux. Idle. Andrew G. Young, of Fosteria, owner.

Plaza Limestone Quarry. Situated 5 miles northeast of Valley Springs, on the Valley Springs and Mokelumne Hill road. The entire output is used for flux at the smelter of Penn Mining Company. Idle. Penn Mining Company, 1713 Harris Trust Building, Chicago, Ill., owner.

MARBLE.

The Columbia area of limestone which is exposed in the neighborhood of Vallecito, Douglas Flat, and Murphy, is extremely irregular, having a general strike of northwest and southeast. Most of the limestone, although retaining a distinct bedded and schistose structure, has become a granular crystalline rock to which the name marble is applicable. When polished it is generally nearly white, marked by faint gray veinings and is rather fine grained. A small amount of development has been done on these deposits, but the quarries are idle due to their distance from railroad transportation.

In the neighborhood of Murphy, east of Mokelumne Hill, and near San Andreas, there are extensive marble deposits which are undeveloped on account of the lack of transportation facilities.

Angels Marble Quarry. Situated 3 miles southeast of the Stanislaus River. The character of the marble developed in the quarry is white, gray, fine grained and marked with faint gray veinings. Two shipments were made from this quarry, but operations were suspended on account of the high cost of transportation.

Equipment: 14″ x 9″ x 10″ Sullivan compressor, 2 marble gangsaws, 2 derrick hoists, and 1 derrick, all of which were driven by electric power. California-American Marble Company, 25 Columbia Square, San Francisco, owner. A. F. Edwards, manager.

Bishop Marble Properties. Situated 2 miles northeast of Melones, on the North Fork of the Stanislaus River. Controls 120 acres. Property undeveloped. Thomas B. Bishop Estate, 166 Geary street, San Francisco, Cal., owner.

Eagle Marble Quarry. Located 1 mile east of Vallecito, controls 160 acres. A small amount of marble has been shipped from this quarry. There is the following equipment on the property: 4-drill Ingersoll-Rand compressor, 12 h.p. derrick hoist, 2 derricks and 2000 feet of 10-inch pipe line. The character of the marble is fine grained, marked with faint gray linings. Idle. Eagle Marble Company, Stockton, Cal., owner. A. R. Kirkland, president.

MINERAL SPRINGS.

Valley Springs Mineral Water Company. Located near the town of Valley Springs, the terminus of the Southern Pacific Railroad. The water flows from a well 150 feet deep. The water is alkalo-sulphurous and rich in chlorides and carbonates. Water is bottled, charged lightly, for sale. Valley Springs Mineral Water Company, Valley Springs, Cal., owners. David Costa, manager.

Mok-Hill Natural Mineral Water. Situated at Mokelumne Hill, 16 miles northeast of Valley Springs, the terminus of the Southern Pacific Railroad.

Mok-Hill Spring was discovered in 1850, during the time of the gold rush and used by the early miners for drinking, in panning gravel, and the overflow from spring was used in ground sluicing in the gulch below the spring. Reopened and the water placed on the market by Herman Maasberg & Bros., on April 15, 1910. The water is bottled and carbonated lightly, the production yearly being about 10,000 gallons. The analysis of water in thousands is as follows:

Calcium bicarbonate	197
Magnesium sulphate	156
Sodium chloride	98
Magnesium chloride	285
Calcium sulphate	109
Calcium carbite	88
Bone ashes	67

The water is very clear, as samples have been allowed to stand four years and show no murkiness. Herman Maasberg, of Mokelumne Hill, owner.

OCHRE.

At Campo Seco, on the Holmes Ranch, there is a body of decomposed slate heavily stained with iron oxide, which forms a durable paint. There are also other deposits of the same character in the neighborhood of Valley Springs. The ocher varies in color from a light yellow to a dark reddish hue.

SANDSTONE.

Late Sandstone Quarry. Situated 1 mile south of Valley Springs. A small quarry was opened up on a bold outcrop. The stone is medium grained white sandstone. Idle. Mrs. E. E. Late, of Valley Springs, owner.

Wildermuth Quarry. Situated 3 miles northeast of Valley Springs. The stone is soft, gray sandstone and is not very compact. Idle. Isaac Wildermuth, of Valley Springs, owner.

SLATE.

Running through Calaveras County there is a great belt of black slate, having a northwesterly and southeasterly course, and which has been exploited to some extent near Tower's Ranch, 2 miles west of Copperopolis, on the Copperopolis and Oakdale road.

SOAPSTONE AND TALC.

Two and one half miles west of Murphy, on the French Gulch road, some talc has been taken out for local use. One mile southwest of Vallecito there is a 50-foot cropping of drab colored talc. It has been quarried for local use for firebacks and boiler linings.

Laidet Ranch. Situated 6 miles east of Mokelumne Hill, on the Calaveras River, in Sec. 3, T. 5 N., R. 12 E. There is a deposit of good grade talc, 3 feet in width, also a reef of soapstone 50 feet wide, and can be traced for 1000 feet on the property. Idle. Aime Laidet, of Mokelumne Hill, owner.

TUOLUMNE COUNTY.

Field work in April, 1914.

INTRODUCTION.

Description.

This county is bounded on the northwest by Calaveras County, on the northeast by Alpine and Mono, on the south by Mariposa, and on the southwest by Stanislaus.

Like most of the counties lying along the main gold belt, Tuolumne covers a portion of the foothills and the westerly slope of the Sierra Nevada, giving the whole county a rugged surface, and to the eastern portion a considerable altitude. A remarkable feature in the topography and geology of this county is the basaltic mesa known as Table Mountain, which, running near and parallel with its northwestern boundary, extends for a distance of nearly thirty miles. This formation consists of a lava flow, which, having filled the channel of an ancient river, stands now, through the degradation of the adjacent country, an isolated mass, its top nearly level and its sides nearly perpendicular—the former more than two thousand feet above the bed of the Stanislaus River, which breaks through it. Flowing through the county in a westerly direction is the Tuolumne River, with its three forks; also three forks of the Stanislaus River—all large streams—the main Stanislaus and its north fork forming in part the boundary between Tuolumne and Calaveras counties.

The county also has scores of lakes, among them Lake Eleanor, a beautiful body of water, which, with Hetch-Hetchy Valley, is one of the scenic wonders of the State. San Francisco aims to secure its entire water supply from the Tuolumne River.

Tuolumne County is not only well supplied with water, but is also abundantly timbered; the more elevated portions being covered with fir, pine, spruce and cedar, and the lower elevations with scrub oak and pine.

While gold mining continues to be the leading industry, farming, viticulture, fruit growing, lumbering and stock raising are here important and growing pursuits. The extensive limestone and marble deposits are being developed on a large scale, and the Columbia Marble Company, owner of the famous Columbia quarry, turns out a product that in beauty, durability and susceptibility to a brilliant polish, is the equal of any other in the United States.

Power plants.

Tuolumne Water Power Company. This property consists of storage reservoirs on the South Fork of the Stanislaus River, main and distributing ditches, and small distributing reservoirs.

TUOLUMNE COUNTY—Table of Mineral Production.

Year	Gold	Silver	Lime		Limestone		Marble		Copper		Miscellaneous and unapportioned	
	Value	Value	Barrels	Value	Tons	Value	Cubic feet	Value	Pounds	Value	Kind	Value
1880	$461,861	$1,071										
1881	500,000	1,000										
1882	400,000										Unapportioned, 1900–1909	$1,301
1883	320,000											
1884	310,000											
1885	320,903	1,473										
1886	432,438	1,551										
1887	504,662	3,166										
1888	475,000	3,500										
1889	446,300	543										
1890	1,500,629	13,062										
1891	1,384,950	139										
1892	1,092,549	911										
1893	354,734	1,329										
1894	547,448	1,072										
1895	666,754	313										
1896	1,070,141	328										
1897	1,809,572	1,696										
1898	1,734,953	15,582									800 M brick	2,288
1899	1,635,769	15,111										
1900	1,596,891	62,367										
1901	1,670,368	39,787									400 pounds lead	16
1902	1,791,829	6,580					7,000	$14,000	155,826	$17,920		
1903	1,732,572	13,989	1,600	$1,600			11,550	28,875			10,367 cubic feet granite	14,020
1904	1,563,907	12,963					11,500	28,750			9,700 cubic feet granite	9,700
1905	1,291,726	21,348	500	1,000			11,000	66,000			9,700 cubic feet granite	9,700
1906	1,039,675	8,476	500	1,000			23,000	46,000			9,700 cubic feet granite 197 tons chrome	9,700 1,379
1907	806,875	6,453	110,000	125,000			22,030	60,120				
1908	798,752	11,732	60,000	69,500	1,233	$6,500	18,503	47,165				
1909	925,703	4,384	60,000	60,000	15,057	28,942	27,600	107,400	9,086	1,154	30 tons chrome	180
1910	615,626	5,754	78,300	78,300	3,600	10,400	17,360	45,400			2,502 pounds lead	111
1911	1,093,484	13,243	75,000	70,000	4,319	13,609	18,966	50,398				
1912	1,113,291	25,146	117,450	121,250	11,554	20,099	27,720	73,920				
1913	974,409	24,381	75,000	85,000	12,446	20,676	37,312	93,726	893	138	893 pounds lead	53
Totals	$32,983,771	$318,450	578,350	$612,650	48,209	$100,226	233,541	$661,754	165,805	$19,212		$48,448

Total mineral production of Tuolumne County from 1880 to 1913, inclusive:

Copper	$19,212
Gold	32,983,771
Lime	612,650
Limestone	100,226
Marble	661,754
Silver	318,450
Miscellaneous and unapportioned	48,448
Total	$34,744,511

The generating station is operated under a static head of about 1000 feet; the four generators of 2500 horsepower capacity are driven by four direct-connected Pelton water wheels, and the power is transmitted by about 30 miles of transmission lines to the principal towns and mines operated by electrical energy. The company also maintains about 85 miles of ditches for mining and agricultural purposes.

Stanislaus Electric Power Company. This power plant on the Stanislaus River generates electric power to operate the street car system of the United Railroads in San Francisco and other cities, while at the same time furnishing lights and power to many places, including towns and mines of this county. The main reservoir, at Relief, has a storage capacity of 550,000,000 cubic feet of water. The electric plant generates 35,000 horsepower.

Railway facilities.

The county has the advantage of direct communication with Stockton by means of the Southern Pacific Railroad to Oakdale, thence over the Sierra Railroad to Jamestown, where one branch runs to Angels Camp, Calaveras County, the other to Sonora and Tuolumne City, the last named being the terminus of the road.

Wagon roads.

Considering the rough character of the country in the county, the roads from the railroad points to the different mining districts are better as a whole than those of any other territory similarly situated.

Mineral resources.

The mineral resources of Tuolumne County consist of chrome, copper, gold, lime, limestone, marble, mineral paint, platinum, soapstone, silver, stone industry, sulphur.

Mining conditions.

There is increased activity in mining operations in Tuolumne County, especially on the Mother Lode belt in the neighborhood of Jamestown, where extensive operations are being carried on at the Jumper, Dutch, and Harvard mines, and the prospects look bright for the reopening of the App and Rawhide mines, which were famous producers in the past. In the neighborhood of Jacksonville, the Eagle Shawmut mine, after a year's shut down for the installation of electric hoisting and underground tramway equipment, has resumed operations on an extensive scale, and will handle a larger tonnage than ever. On the east belt, in the granodiorite area in the Soulsbyville district, the wonderful showing of the Black Oak mine (which, through its modern cyanide plant has successfully demonstrated the treatment of the base ores of this district), has caused a renewal of interest in this belt by mine operators, as several old and new properties are being reopened.

In the neighborhood of Tuolumne there is a notable revival in mining, as the New Albany and Providence mines have resumed operations and promise to be steady producers.

Increased activity is being shown in pocket mining on Jackass Hill, near Tuttletown, and on Bald Mountain in the neighborhood of Sonora and Columbia.

Owing to the large amount of rain during the past year, a great number of gravel mines have reopened, and there should be a great increase in production from this source of mining. An extensive amount of development is under progress on the ancient river channels of Table Mountain, especially notable being the driving of a 6000-foot tunnel by the Springfield Tunnel and Development Company at Columbia, which if successful will mean a boom for this famous old camp as a gold producer.

In this county there still remains a large area of unexplored territory, on both the central and east belts, which only wants the capital to open up new producing mines.

CHROME IRON.

Deposits of chromite occur in a belt of serpentine southwest of Chinese Camp, and there are also abundant loose masses of small size in serpentine northwest of Mountain Pass.

Marianno Iron Mine is 1½ miles west of Chinese Camp, on the Marianno ranch. There are several shallow deposits of chromite, on which a small amount of development has been done, in the way of open cuts and shallow shafts. The ore developed is of very good quality, but not enough work has been done on these deposits to determine their extent. Several shipments have been made to Atkins, Kroll & Co. J. F. Marianno, of Chinese Camp, owner.

COPPER.

Copper Belt. Through the western end of the county the copper belt presents two branches. It enters the county from the north closer to the Mother Lode belt than elsewhere, being from 2 to 3 miles westward.

The two divisions of the belt diverge somewhat in crossing the county southeastwardly, and both are marked at intervals by outcrops of cupriferous veins and by old shafts of shallow depth, which indicate the many prospecting efforts of former periods. The western branch of the belt is the stronger one. From Copperopolis, in Calaveras County, it enters Tuolumne County at Byrne's Ferry and passes through the Don Pedro district to the southeast. The eastern branch enters the county just west of Tuttletown and passes out at Moccasin Creek, at the south. There are no developed properties on this belt, but the belt is clearly defined and exhibits favorable indications.

Mines.

Mackey Ranch Mine is a prospect 2½ miles south of Jamestown, on ridge west of Woods Creek. Ore occurs in lens-shaped deposit in belt of serpentine, showing oxides and sulphides of copper. Shaft 125 feet deep. Idle. Peter Mackey, of Jamestown, owner.

Mann Copper Mine is 3 miles south of Jamestown, in a belt of serpentine lying to the west of the Mother Lode. Shaft 90 feet deep. Character of ore, chalcopyrite, associated with pyrite. Idle. D. L. Mann, of Jamestown, owner.

Mitchell (or *Bonne Terre*) *Mine.* About 1 mile west of Oak Hill mine, on patented ground. Shaft 100 feet deep. Idle. Locke Robinson et al., of Sonora, owners.

Oak Hill Copper Mine (see Bull. No. 50, p. 250).

Washington Mine (see Bull. No. 50, p. 249). In Sec. 30, 31 and 32, T. 2 S., R. 15 E. W. E. Henseley et al., owners.

GOLD.

Geology.

Mother Lode Belt. Passing southward from Calaveras County into Tuolumne at Robinson's Ferry, the Mother Lode belt is found to continue in an almost unbroken line to the southern boundary of the county, and beyond into Mariposa County. There is a slight break in its continuity near Tuttletown, another break of about 1000 feet between Whiskey Hill and the Dutch mine, and still another near the foot of Priest's Hill, on Moccasin Creek. The lode is characterized by its massiveness and distinguished by the persistent occurrence of massive quartz croppings and broad zones of ankerite. Some of the most important mines on this lode are found not in the belt of ankerite and quartz, but in the hanging-wall side of the ankerite zone.

Some mines along the lode have serpentine as a footwall, as in the Jumper and Rawhide mines.

The Mother Lode system may be divided into three veins: the footwall vein, boulder vein and hanging-wall (or east) vein.

The pay ore is found in the form of a stringer lead, consisting of a mass of quartz stringers cutting the schists and clay slates, while the main boulder vein of quartz is very low grade, and as a rule does not pay to mine.

The East Belt. The mines of the East Lode, which are found from 6 to 18 miles east of the Mother Lode belt, occur in the slates of the Calaveras formation and in granodiorite. The east belt veins are gold bearing, containing auriferous pyrite and some galena. The ore bodies are formed in lens-shaped ore shoots. The character of the ores in the granodiorite is base, containing free gold associated with the heavy sulphides, pyrrhotite, marcasite, sphalerite, galena, pyrite, and some chalcopyrite.

Big Oak Flat and Groveland Districts. In the quartz-diorite area at Big Oak Flat are several large veins which dip at small angles, varying from 25° to 55°. These veins are not confined to the granite, but extend into the surrounding schists. The veins have been extensively exploited on the Mississippi, Mack, and Longfellow claims. In the hard mica schists in the neighborhood of Groveland are numerous gold quartz veins, which have been exploited in the past, but at present writing there are no mines operating in the district.

In the Big Oak Flat district the Mack and Longfellow are operating on a small scale. The ores in these districts are free milling, occurring in lenses. The values as a rule are confined to the free gold in the quartz, and the sulphurets are low grade.

GOLD MINES—QUARTZ.

Abbie L. Mine (quartz). At Big Oak Flat, on Eureka-Mississippi vein. Tunnel 200 feet long. Idle. M. W. Hilliard, of Big Oak Flat, owner.

Alabama Mine (quartz). (See our Reports X, pp. 53, 741; XI, p. 298; and XIII, p. 472.) It is 2 miles northwest of Jamestown, on the south slope of Table Mountain. Three veins on property—east, boulder and west. The boulder vein shows massive quartz croppings, with an ore zone from 20 feet to 200 feet wide, which was mined from an open cut and a shaft 300 feet deep. The veins have a course of N. 25° W., dip 65° NE. Large body of low-grade free milling ore, containing 25% pyrite. Idle. Joseph D. Redding, Crocker Building, San Francisco, owner.

Alameda Mine (quartz). (See our Reports X, p. 55, and XI, p. 508.) Situated 3 miles northwest of Jamestown, about 1 mile north of the Rawhide mine. The walls are slate, the quartz of the vein being very irregular, and the vein matter composed of talc, quartz and mariposite. Course of vein is N. 35° W., dip 65° NE. Shaft 920 feet deep was sunk on vein, and a crosscut tunnel from Greenhorn Gulch intersected the shaft at 250-foot level. Workings now caved. Idle. Chas. Fitzgerald et al., of Quartz, Tuolumne County, owners.

App Mine (quartz). (See our Reports VIII, pp. 660–661, and XII, p. 299.) Situated 2 miles south of Jamestown, on the northwest slope of Quartz Mountain. Controls the following claims: App, Heslep, App mill site, Heslep mill site, Hitchcock, total holdings being 40 acres. Vein composed of dolomite, mariposite, containing abundant stringers and lenticular bunches of quartz, talcose schist and a dike of altered diorite. The hanging-wall is a hard diorite with a Calaveras slate footwall, having a heavy black slate gouge on footwall. Course of vein is N. 30° W., dip 65° NE; width of vein, 30 feet. Two shoots of ore were mined. Work was carried on through an incline shaft 1340 feet deep. Levels were driven on the vein north and south at intervals of 100 feet.

Equipment: 250 h.p. double-drum hoist, Ingersoll-Rand compressor, electrically driven.

Mill: Two 10″ x 20″ Blake crushers, 60-stamp mill, 1000-pound stamps, 24 Frue vanners. Mill driven by electricity. Property being reopened. Estate of T. W. Patterson, Fresno, owner. Alexander Chalmers, of Angels, agent.

Arbona Mine (quartz). Situated at Tuttletown, on ridge north of Mormon Creek. The vein is 5 feet to 10 feet wide, of solid quartz, containing a small percentage of pyrite. Course of vein is N. 35° W., dip 65° NE. An incline shaft 600 feet deep has been sunk on vein. Underground workings consist of drifts on vein on 100′, 200′, 350′ and 500′ levels. Equipment: 60 h.p. boiler, 30 h.p. single-drum hoist, 5-drill, 2-stage compressor. Mill: 6″ x 8″ Dodge crusher, 10-stamp mill, 850-pound stamps. Four 4-foot Frue vanners. Idle. Calmas Mining Company, 68 Essex street, Boston, Mass., owner.

Argentine Mine (quartz). (See our Report XII, p. 299.) Situated in American Camp district, 10 miles northeast of Columbia. J. B. Pownall, of Columbia, owner.

Atlas Mine (quartz). Located on northwest slope of Jackass Hill, 1 mile north of Tuttletown. In amphibolite schist; the ore body is from 10 feet to 30 feet wide, consisting of small irregular veins cutting the schists. Ore is free milling, with 6% pyrite. Two shafts have been sunk on the vein, main working shaft being an incline 375 feet deep. Ore is being mined on 125′, 240′, and 340′ levels. West shaft 124 feet in depth.

Ore is hoisted by single-drum, direct-driven electric hoist, driven by 40 h.p. motor. A 480-cubic-foot Ingersoll-Rand compressor, driven by 75 h.p. motor, furnishes air for drills. Incline tramway from mine to mill, 600 feet long. A 5 h.p. electric hoist hauls 1¼-ton cars from mill to bins.

Mill: 9″ x 16″ Blake crusher, 10 stamps (weighing 1050 pounds per stamp), dropping 6 inches, 104 drops per minute, crushing 4½ tons per stamp through 35-mesh screen; two Callow tanks having a capacity of 50 tons, two No. 4 Deister tables, one Gates concentrator, and two 6-foot Frue vanners. Concentrates have a value of $25 per ton. An extraction of 82% is made by amalgamation and concentration.

Twenty-five men are employed. Atlas Mines Company, Jamestown, owner. T. L. Whitney, manager.

Banner Mine (quartz). It is 2 miles southeast of Big Oak Flat, on Cobbs Creek. Tunnel 300 feet, shaft 60 feet. The course of vein is due E. and W., dip 45° N. Idle. Chas. Harper, C. E. Watson of Big Oak Flat, owners.

Bell Mine (quartz). Located 1 mile west of Tuttletown, on ridge northwest of Mormon Creek. The vein is in the form of a stringer lead, consisting of a mass of quartz stringers cutting the schists. Vein has an average width of 30 feet, with black Calaveras slate footwall and a hanging-wall of diabase. Course of vein is N. 35° W., dip 65° NE. Work was carried on through an incline shaft 600 feet deep, with drifts north and south on vein at 300′, 400′, 500′ and 600′ levels. Idle. Philip Rowe, George Rowe et al., of Tuttletown, owners.

Belmont Mine (quartz) is 1 mile north of Sonora, on ridge east of Woods Creek. Mined for rich pockets. Series of shafts and tunnels on property. Two men employed. G. E. Garrett, of Sonora, owner.

Bellevue (Hyde, Golden Treasure) Mine (quartz). (See our Reports VIII, p. 670; X, p. 755; XI, p. 501, and XII, p. 299.) It is 6 miles northeast of Sonora. Idle. Bellevue Mining Company, San Francisco, owner.

Bicknell Mine (quartz) is 1 mile east of Big Oak Flat, on an east and west vein dipping 38° N. Developments consist of three tunnels, 300 feet, 200 feet and 100 feet in length. Idle. Mrs. Raggio, of Big Oak Flat, owner.

Black Hawk Mine (quartz) is a prospect 1 mile west of Soulsbyville. The strike of vein is northeast and southwest, dip 85° SE. The formation is granodiorite. Crosscut tunnel is 125 feet long. Idle. R. A. Nichols, of Soulsbyville, owner.

Black Oak Mine (quartz). (See our Reports VIII, p. 665; X, p. 744; XI, p. 500; and XII, p. 299. Bulletin 18, p. 137, by W. H. Storms.) Situated 1 mile west of Soulsbyville, and comprising the following claims: Black Oak, Live Oak, White Oak, Carra, and Carra Fraction. It occurs in granodiorite. The vein varies from 1 foot to 25 feet in width, and has several branches coming in from the hanging-wall side. The course of the vein is N. 15° E., with a dip of 60° to 70° W. The ore forms in kidneys and lenses on the intersection of diorite dike crossings and in the neighborhood of a fault. The diorite dikes vary from 1 to 2 feet in width, with a strike of N. 55° E., having a vertical dip. On the 1300-foot level, 385 feet north of shaft, the vein was found to be faulted 110 feet to the west; course of fault is N. 60° E., with a dip of 75° N. The ores are quartz, containing iron, copper, lead and zinc sulphides, in the form of pyrrhotite, sphalerite, marcasite and galena.

Work is carried on through a shaft 1700 feet deep on 70° incline. On the 1700-foot level the shaft is 16 feet in the footwall. Levels are driven on the vein north and south, 100 feet apart. Stoping operations are being carried on in the 1000-foot, 1300-foot, 1400-foot and 1500-foot levels. Two ore shoots have been developed—one north of shaft, 500 feet long, with an average width of 4 feet; the other south of shaft, 300 feet long, with a width of 20 feet. Ore hoisted by 100 h.p. single-drum electric hoist. Air for drills, pumps and underground hoist furnished by 19″ x 16″; 11″ x 16″ Ingersoll-Rand compressor. Water handled by 10″ pump, 8″ Jack head pump, and two 6″ x 8″ horizontal duplex Dow pumps.

A view of the Black Oak Mine, Soulsbyville, Tuolumne County, California.

Mill: 10″ x 20″ Blake crusher, 20 stamps, weighing 1250 pounds each, dropping 6 inches, 100 drops per minute, crushing 3.5 tons per stamp through 10-mesh Tyler ton cap screens. Ore is crushed in 1.85% cyanide solution, or 3.7 pounds of cyanide per ton of ore.

The pulp from the batteries passes to a Dorr standard duplex classifier, from which the coarse material goes direct to a 5′ x 18′ tube mill, being diluted to 39% moisture. Slime overflow passes through the treatment tanks. Discharge from tube mill is returned to classifier by bucket elevator (closed circuit used). The tube mill is driven by 75 h.p. motor, with a chain drive; mill makes 23 revolutions per minute. Pulp from classifier goes to 20′ x 10′ Dorr thickener, thickened from 6 to 1 consistency to 2 to 1 for agitation, and pulp from thickener is elevated by 2½-inch air lift. Three Pachuca type agitators 10′ x 30′ are connected for continuous agitation. A spider with six radiating jets supplements the main working air jet as a help in starting at any time. The spider and main jets are connected with both high pressure air and high pressure water. An 8″ x 10″ Ingersoll-Rand compressor furnishes air at 40 pounds pressure for the agitators, air lift and vacuum filter. Power for agitation is 3.4 h.p. per agitator. Pulp from agitators flows to another Dorr thickener (10′ x 20′), and overflow from No. 2 thickener to collecting tank, from which it is pumped to the clarification and precipitation presses. The thickened underflow passes to the filter. The filter is an Oliver, with a drum 11′ 6″ in diameter and a 12-foot face. Capacity 100 tons per day. Cake formed from one half to five eighths inch thick. Solution from filter discharges into collecting tank and is pumped to two 24-inch, 36-frame Shriver filter presses for clarification. From the gold tanks, the clarified solution is pumped to a 52-inch, 16-frame Merrill press, and zinc dust added to suction of the pump. The barren solution passes from the precipitation press to the sump, from which it is returned to the stock tanks above the mill by a triplex 5½″ x 8″ Platt pump, where it is brought back to normal strength. Lime is added to the batteries and agitators (0.15 % CaO), 24 pounds of litharge added to tube mill and agitators. Mill operated by electric power from San Francisco and Sierra Power Company, coming in at 15,000 volts and transformed to 440 volts. The mill makes an extraction of 96 per cent. The cyanide consumption averages 1.5 pounds per ton of ore, lime 3 pounds. The daily capacity of mill is 75 to 100 tons per 24 hours. Ore milled averages about $20 per ton. Costs of operation are as follows:

	Per ton
Development	$1.634
Mining	2.224
Treatment	1.588
General	0.273
Incidentals and office	0.133
Assaying	0.101
Stable	0.054
Material (mill)	0.962
Labor (mill)	0.623
Total	$7.592

Eighty-six men are employed. Black Oak Mines and Milling Company, First National Bank Building, San Francisco, owner; C. E. Knox, general manager.

Blue and White Star Mines (quartz). They are 4½ miles south of Tuolumne, on ridge south of the Tuolumne River. The vein is developed by three tunnels, 320′, 150′, and 250′ in length. The course of vein is east and west, with dip 45° N. Two men are employed driving lower tunnel. J. Hienberg, Chas. F. Stucki, of Tuolumne, owners.

Blue Lead Mine (quartz). It is 3½ miles north of Tuolumne, in granodiorite formation. Series of parallel veins with a north and south strike and dipping 75° to the west. Two shafts 200 feet and 130 feet deep. Two men employed. Under lease to A. S. Burge and F. H. Rood, of Spokane, Wash. Mrs. L. E. Fowles, of Arrastraville, owner.

Boitono Mine (quartz) is a prospect, 2 miles west of Groveland. Idle. A. Boitono, of Deer Flat, owner.

Bonanza Mine (quartz). (See Reports VIII, p. 652; IX, p. 37; X, p. 736; XI, p. 511; XII, p. 299.) This property, located in the town of Sonora, on the Bonanza lead, has been famous as having produced very rich pockets, ranging from $1000 to $300,000. The vein strikes N. 30° E., dip 23° E. Width of vein is from 18 inches to 2 feet. A diorite-porphyry dike accompanies the vein on the hanging-wall side. The footwall is limestone and the hanging-wall a mica schist. Shaft sunk to a depth of 185 feet on 70° incline, then on a 23° incline for 600 feet on vein. At this level a drift was run 100 feet west on vein, then a winze sunk on the vein 800 feet deep on 23° incline. Three men are employed unwatering property, for the purpose of resuming operations. A. R. Oliver, of Sonora, owner.

Brown Mine (quartz) is 3 miles west of Tuttletown, on ridge south of the Stanislaus River. Shaft 700 feet deep, from which a 10-foot vein was cut by several crosscuts. On the 400-foot level a crosscut was driven 128 feet beyond the vein, into the hanging-wall. Idle. Brown Mining Company, of San Francisco, owner.

Buchanan Mine (quartz). (See Reports VI, Part II, p. 60; VIII, p. 666; X, p. 752; and XI, p. 494.) It is 10 miles southeast of Tuolumne, on ridge north of the middle fork of the Tuolumne River. Course of vein is northeast and southwest, dip 60° SE. Formation is a Calaveras slate. Idle. Davis Estate, of Tuolumne, owners.

Buzzard's Roost Mine (quartz). (See Report XI, p. 506.) It is 8 miles from Sonora, on south fork of Stanislaus River. Idle. Vivian & Gerloch of Sonora, owners.

Carlin Mine (quartz). At Jamestown, on Woods Creek, on vein east of main Mother Lode vein. Course of vein N. 45° W., dip 33° N. The vein has an average width of 5 feet. Developments consist of a tunnel 550 feet long. At a point in the tunnel 500 feet from mouth, sinking a 3-compartment shaft. Six men employed. Jamestown Exploration Company, owner, 32 South California street, Stockton. J. P. Mangante, manager.

Carlotta Mine (quartz). (See our Report XI, p. 499.) It is 1 mile north of Tuolumne, on ridge west of Cherokee Creek, comprising 3 claims—Carlotta, North Carlotta, Pennsylvania. Two veins on the property in granodiorite country rock. The strike of Carlotta vein is N. 45° E., dip 80° NW.; Pennsylvania vein, N. 20° E., dip 20° E. Veins have an average width of 18 inches. On the Carlotta vein there is a shaft 246 feet in depth, while the Pennsylvania vein has a shaft 200 feet in depth. The ore occurs in lenses, and the quartz contains the sulphides, pyrrhotite, sphalerite and galena. There are compressors, hoists and 5-stamp mill on property. Idle. D. B. Neagle, E. J. Murphy et al., of San Francisco, owners.

Carrington, Chillena, Santisimo, Street Extension and *Wilson & Means Pocket Mines* (quartz). Situated 1 mile northwest of Tuttletown, on Jackass Hill. The veins are irregular quartz stringers cutting the schists. Series of shafts on properties having depths of 100 to 200 feet. General course of veins is northwest and southeast, with a dip of 60° NE. Six men employed. C. A. Gillis, W. R. Gillis and T. H. Bluett, owners.

Chaparral Mine (quartz). (See our Report XI, p. 496). It is 12 miles southeast of Sonora, near Buchanan mine. The veins are in black slate and are developed by several tunnels 100 feet to 600 feet long. Idle. Fred Wenzel, of Sonora, owner.

Clio Mine (quartz). (See our Report X, p. 47.) It is ½ mile south of Jacksonville, on ridge north of the Tuolumne River. Comprises three claims, 1500 feet each in length. The vein is on the contact between slates and serpentine, having a slate hanging-wall and a serpentine footwall. Course of vein is N. 40° W., dip 65° NE. Developments consist of a crosscut tunnel 600 feet long which cuts the vein 450 feet from the mouth of the tunnel. Drift on vein north 125 feet, where a winze was sunk on the vein to a depth of 400 feet. There is a single-drum hoist, Leyner compressor and 10-stamp mill on property. Idle. Clio Mining Company, 5660 San Julian street, Los Angeles, owner. Dr. E. F. Henderson, agent.

Columbus Mine (quartz). (See Report XII, p. 301.) Situated 2 miles north of Tuolumne, on ridge west of Cherokee Creek. On the Eureka-Dead Horse lead, shows massive outcrop of quartz with an ore zone 60 feet in width. Strike of vein N. 35° W., dip 55° NE. Formation is a mica schist, the vein being accompanied by diorite-porphyry dike on hanging-wall. The developments consist of an incline shaft 230 feet deep, sunk on the vein, with drifts north and south on 100-foot and 200-foot levels. Electric hoist, compressor and 10-stamp mill on property. Idle. J. Goldman, S. C. King et al., of San Francisco, owners. T. G. Winwood, superintendent.

Confidence Mine (quartz). (See Report XI, p. 503; Bull. 18, by W. H. Storms, p. 136). Situated 7 miles northeast of Tuolumne, at an altitude of 4000 feet, in the granite area lying east of the Calaveras formation. The course of vein is N. 14° W., dip 25° E. Incline shaft was sunk on vein to a depth of 810 feet. About 600 feet north of shaft on 810-foot level there is a winze 265 feet deep. The vein varies from 12 inches to 15 feet in width. About 1200 feet north of the main shaft there is an incline shaft 810 feet deep. All machinery has been dismantled and sold, and main shaft is caved. Idle. Confidence Gold Mining and Milling Company, 1051 Mills Building, San Francisco, owner.

Consuella Mine (quartz). (See Report XII, p. 301.) It is 1½ miles southeast of Tuolumne, and east of the north fork of the Tuolumne River. Idle. D. B. Warfield, of Oakdale, owner.

Cosmopolite Mine (quartz). (See Report XI, p. 494; XII, p. 301.) It is ¾ mile southeast of Groveland, on a stringer lead. Two veins, cutting a slate formation; one with a course N. 18° W., dip 38° NE., the other N. 65° E., dip 50° NW. Crosscut tunnel 300 feet to N. 18° W. vein, with drift 300 feet north and 150 feet south. Shaft 110 feet deep. Two men employed milling dump material. There is a 5-stamp mill on the property. M. C. Merrill, of Groveland, owner.

Crystalline Mine (quartz). Situated 1½ miles west of Jamestown, on southeast slope of Whiskey Hill. Central vein shows a massive outcrop of quartz, while east and west veins are in the form of numerous quartz stringers cutting the schist. Vein material contains free gold and pyrite in a gouge of dolomite, mariposite and talcose slates. The true footwall is serpentine, with Calaveras slate hangingwall. The course of veins is N. 35° W., dip 65° NE. Average width of veins about 5 feet.

Work was carried on through a vertical shaft 625 feet deep and an incline shaft 300 feet deep, 750 feet south of main shaft. From main working shaft on 300-foot level, a crosscut was driven to vein 450 feet east and drifted on vein 750 feet south and 400 feet north. On 600-foot level, crosscut to vein a distance of 250 feet, and a drift south 600 feet, at which point a 125-foot crosscut cut east vein, which was drifted on 100 feet south and 150 feet north. Mine equipment consists of double-drum steam hoist, and 6-drill Laidlaw, Dunn-Gordon compressor.

Mill: 9″ x 15″ Blake crusher, 10-stamp mill, 850-pound stamps, four 6-foot Frue vanners, driven by 50 h.p. motor. Idle. C. E. Shafer, of Jamestown, owner.

Darrow Mine (quartz). A prospect, 3 miles northwest of Jamestown, on ridge north of Greenhorn Gulch. Operated as a pocket mine. Worked through a series of shallow shafts and tunnels. Four men employed. J. H. Darrow, of Jamestown, owner.

Deadhorse (see *United Mines.*)

Del Monte Mine (quartz.) At Groveland, on an east and west vein, in mica schist. Shaft 200 feet deep. There is a 3-stamp Nissen mill on property. Idle. Sierra Gold Mining Company, Arlington Heights, Ill., owner.

Densmore Mine (quartz). (See Bull. 18, p. 135, by W. H. Storms.) It is 2 miles northwest of Columbia, on slope of ridge east of the Stanislaus River. The course of the vein is northwest and southeast, dip 60° NE., with an average width of 5 feet. The formation is granodiorite. It is a heavy sulphide ore, containing pyrite, marcasite, sphalerite, galena and pyrrhotite. Developments consist of a tunnel 400 feet long on the vein and a shaft 500 feet deep. There is a 10-stamp mill on the property. Idle. Thomas Symonds, Murphy, et al., of Columbia, owners.

Draper Mine (quartz). Situated 1 mile west of Soulsbyville, adjoining the Black Oak mine on the northeast. Three parallel veins cut the granodiorite formation. The east vein is 175 feet east, and west vein is 170 feet west of middle vein. The course of the veins is N. 20° E., dipping from 50° to 75° W. The average width of veins is 18 inches.

Developments consist of an incline shaft 630 feet deep and drifts north and south on 100′, 200′, 300′, 400′, 500′ and 600′ levels. The character of the ores is a heavy sulphide, containing free gold associated with pyrite, pyrrhotite, marcasite, galena and sphalerite. Mine equipment consists of 60 h.p. electric hoist, 5-drill Giant compressor, 10-inch Cornish pump, electric driven. There is a 10-stamp mill on property. Ten men employed retimbering shaft and unwatering mine to resume operation. M. McCormick Company, Stockton, owner. Con Sullivan, superintendent.

Dreisam Mine (quartz). (See Bull. No. 18, p. 139.) It is 2½ miles north of Tuolumne, on ridge east of Turn Back Creek, in granodiorite formation. There are three veins on property, with the following courses: Cutter vein, N. 40° W., dip 45° NE.; Yellow Jacket vein, N. 80° E., dip 80° E.; Ophir, N. & S., dip 75° E. Average width of veins is about 18 inches. Ore forms in lenses. The veins are cut by a series of diorite dikes from 6 inches to 2 feet in width. The Yellow Jacket vein is faulted 50 feet to west by Cutter vein on 200-foot level. Work is carried on through a shaft 500 feet deep. The character of the ore is base, with free gold, pyrrhotite, pyrite, marcasite, galena and sphalerite. Ore is hoisted by 75 h.p. single-drum electric hoist. Air furnished by 2-stage Rand compressor, driven by 75 h.p. motor.

Mill: 9″ x 15″ Blake crusher, 6-stamps (3 stamps per battery), two 4-foot Frue vanners. Mill driven by 20 h.p. motor. Seven men employed. J. E. Conde et al., of Arrastraville, owners.

Duffield Mine (quartz). It is 2½ miles northeast of Tuloumne, adjoining the Driesam mine on southeast. The vein is on a contact between granodiorite and slate, with former as a footwall and the latter for a hanging-wall. Strike of vein is north and south, dip 75° W. Work was carried on through a crosscut tunnel 130 feet to vein with a drift north on vein 325 feet. Winze sunk on vein 80 feet below tunnel level. Vein has an average width of 12 inches. A 10-stamp mill on property. Idle. Andrew Scanavino et al., of Tuolumne, owners.

Duleek Mine (quartz) is 5 miles northeast of Groveland, on an east and west vein, dip 80° S. Shaft 200 feet deep. Idle. Mrs. E. Foster, Berkeley, owner.

Dutch Mine (quartz). (See Reports X, p. 51; XI, p. 509; Bull. 18, p. 130.) Situated 2 miles south of Jamestown, at Quartz Mountain. Holdings consist of Dutch, Dutch Mill Site, Sweeney, Sweeney Mill Site, making a total of 70 acres. On the Mother Lode, which is a complex structure composed of dolomite, mariposite and quartz with lenses of amphibolite schist. Both walls are of Calaveras slates. On the Dutch claim the lode splits into two veins about 75 feet apart. East vein is very irregular, breaking up into stringers which run in all directions, while the west vein is more regular.

The general course of the veins is N. 35° W., with a dip of 65° NE. Main working shaft sunk on 65° incline to a depth of 1800 feet. North of main shaft is Sweeney shaft, 200 feet deep. Levels have been driven on the vein north and south 100 feet apart to the 1200-foot level, the remaining levels being at 150-foot intervals. Work being carried on in 1000-foot, 1650-foot and 1800-foot levels. An ore body has been developed on the 1650-foot level south, 150 feet long, with an average width of 16 feet. Water is handled from 1000-foot level by Dean triplex pump, driven by 25 h.p. motor; capacity of 60,000 gallons.

The Dutch Mine, showing mill and hoist near Jamestown, Tuolumne County, California.

Equipment: 150 h.p. double-drum electric hoist, one 450-cubic foot Leyner compressor and one 1000-cubic foot Rand Duplex compressor.

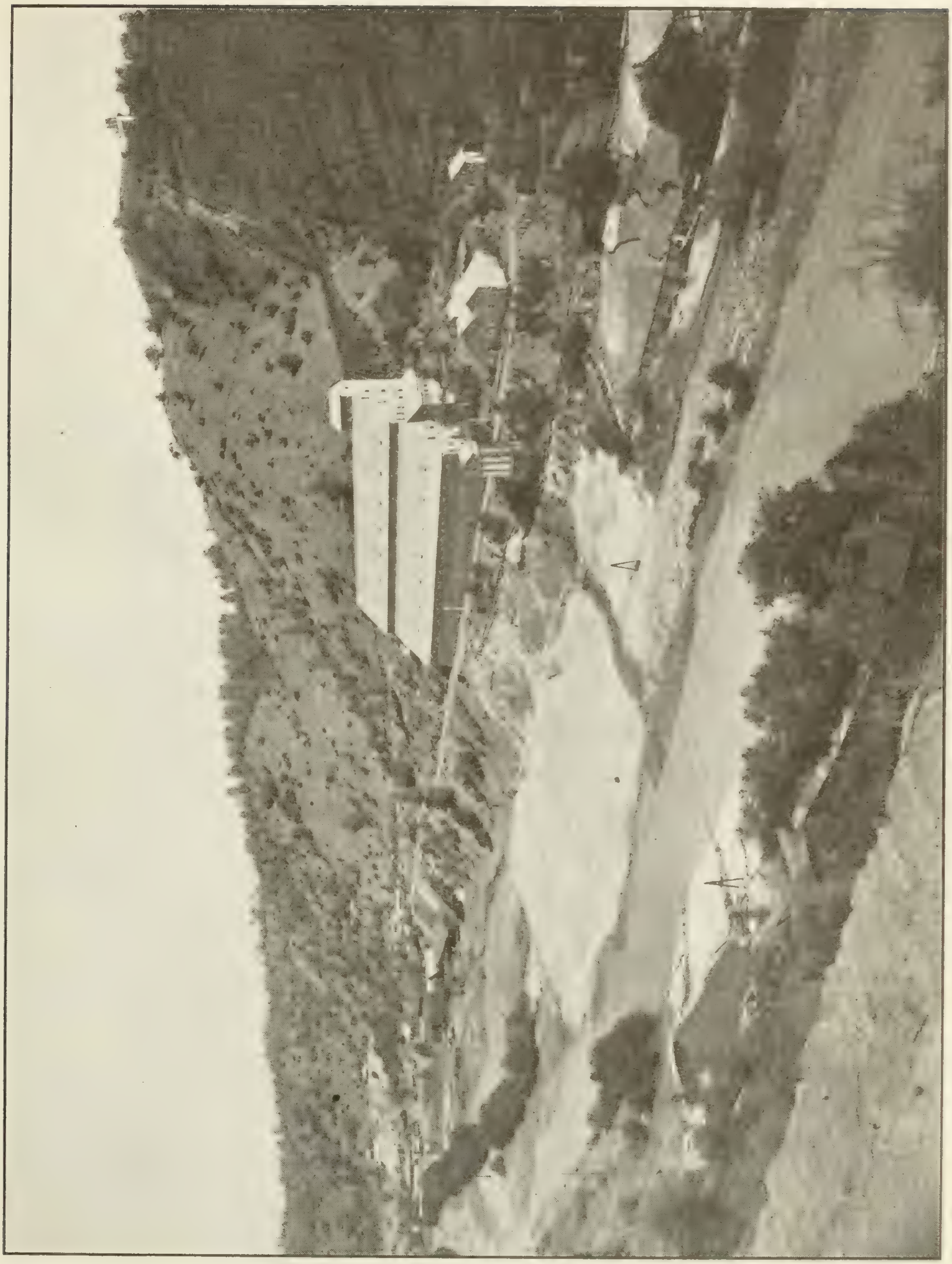
Mill: 10″ x 20″ Blake crusher, 40-stamp mill, 1050-pound stamps, dropping 6 inches, 106 drops per minute, crushing 5 tons per stamp through 20-mesh; stamps driven by two 50 h.p. motors. Pulp from batteries flows over eight 6-foot Johnson and ten 6-foot Frue vanners. Concentrators driven by 15 h.p. motor. An extraction of 86% is made by the mill. Concentrates assay $36 per ton; total operating costs are

$2.30 per ton. There are sixty-four men employed. Dutch Consolidated Gold Mining Company, Sonora, Tuolumne County, owner. C. H. Segerstrom, manager.

Eagle-Shawmut Mine (quartz). (See Report X, p. 48; Bull. 18, p. 132). Situated 2 miles northwest of Jacksonville, on Woods Creek. The vein is distinguished by massive quartz croppings along its course. The hanging-wall country is amphibolite schists; the footwall is slate. An ankerite zone contains veins or lenses of quartz carrying gold in paying quantities, besides which there is a broad zone of amphibolite schist on the hanging-wall side, in which there is a gold-bearing shoot. This rock is a heavy sulphide ore, containing about 3% auriferous sulphides. The Shawmut vein is 33 feet wide and dips 72° NE.; Eagle vein has an average width of 12 feet and dips 63° NE. Course of veins is N. 40° W. Four pay shoots have been developed on the property, from 200 feet to 400 feet long, with average width of 12 feet. Pay ore is found east and west of the main boulder vein, in the form of stringer leads, consisting of numerous stringers cutting the slates, heavily mineralized with auriferous pyrites. Ore shoots trend north. The main developments consist of a crosscut tunnel driven 1100 feet through the footwall to the vein, and a shaft sunk on the vein to depth of 1600 feet; tunnel connects with shaft on the 400-foot level; 75 feet north of main shaft a winze has been sunk on vein from 1500-foot level to a depth of 600 feet; eighteen levels 100 feet apart have been driven on the vein north and south of shaft. Ore hoisted by 200 h.p. direct-connected electric hoist, and dumped into 75-ton storage bins. Trammed from bins in two 5-ton cars, hauled by 50 h.p. electric motor, and dumped into rock breaker bins, from which it is fed by gravity to two No. 5 Gates gyratory crushers. Product from Gates crushers is conveyed by 30-inch belt conveyor, 120 feet long. Elevated by bucket elevator (buckets 12″ x 20″) to bin in center of mill above 30-inch Robins belt distributor, which distributes ore to mill bins above batteries, having a capacity of 4000 tons. A 75 h.p. General Electric motor drives crushers, conveyors and elevators.

Mill: 100 stamps, 1000 pounds each, dropping 100 drops per minute through 6 inches, and crushing 5 tons per stamp through 20-mesh screen. Pulp from battery plates flows over forty 6-foot Frue vanners, one Card table and one Deister table. Mill driven by water power.

Power plant at mine generates power for electric tram, hoists, crushing machinery and lights. Water purchased from Sierra and San Francisco Power Company, 2 miles of 10-inch pipeline from company ditch to mine, with a head of 900 feet. Concentrates from mill are treated by a 20-ton chlorination plant, operated by the company. Eagle-Shawmut Mining Company, 1024 Merchants Exchange Building, San Francisco, owner. J. Williamson, manager.



The Eagle-Shawmut Mine, showing 100-stamp mill and hoist; also the Tarantula Mine, to the north. Jacksonville, Tuolumne County, California.

Eureka and Mississippi Group of Mines (quartz). It is at the lower end of Big Oak Flat, on an east and west vein, with a dip of 30° N. The formation is quartz-diorite and mica schist. Shaft 400 feet deep and tunnel 500 feet on vein. Idle. Santa Ana Mining Company, 152 Federal street, Boston, Mass., owner.

Eureka Mine (quartz). (See Report XII, p. 302.) It is in Sonora. There are two veins about 20 feet apart, one in black slate, the other in chlorite schist. Shaft 120 feet deep. Idle. J. T. Faxon, of Sonora, owner.

Excelsior Mine (quartz). Situated 4 miles northeast of Confidence. The veins lie in a formation of granodiorite, and have a strike of north and south, with a dip of 35° E. Vertical shaft 235 feet deep; incline shaft 200 feet deep. Two men employed sinking a new shaft. Fred Sutton, of Sonora, owner.

Experimental Mine (quartz). It is 2 miles northwest of Columbia in Experimental Gulch, to the south of the north fork of the Stanislaus River. The vein is a true fissure in limestone. The course of the vein is N. 45° W., with dip 45° NE., and has an average width of 5 feet. The ore is free milling, containing coarse gold, pyrite, chalcopyrite, galena and occasionally tellurides of gold and silver.

Ore shoots are formed on intersection of cross diorite-porphyry dikes with the vein, which strike N. 60° E., dip 85° N. The mine is developed by incline shaft 300 feet deep, and a crosscut tunnel 1275 feet to vein and drift south 525 feet on vein. One 3-stamp mill at shaft, and a 2-stamp mill under operation below mouth of tunnel. Concentrates assay as high as $100 per ton. Eight men employed. Thomas Conlin, of Columbia, owner.

Florence Mine (quartz). (See Report XII, p. 302.) It it 1 mile southeast of Tuttletown. Idle. H. Orlando, of Tuttletown, owner.

Fox, Hudson, Calhoun and Ford Group of Mines (quartz). They are 1½ miles southeast of Columbia, on the north slope of Bald Mountain. The vein occurs in a mica schist and strikes N. 10° E., dip 72° E. Work is carried on through Fox tunnel, which crosscuts the vein 150 feet from the entrance, and a drift run 300 feet north and 200 feet south on the vein. A winze is sunk on vein 240 feet below tunnel level. On the Ford claim there is a crosscut tunnel 2000 feet in length to vein. Three men employed sinking winze. Thomas Conlin, of Columbia, owner.

Garfield Mine (quartz). (See Report XII, p. 302.) Situated 1 mile southeast of Tuolumne, on the north fork of the Tuolumne River. Course of vein is N. 35° W., dip 50° NE., in a mica schist. Shaft 75 feet deep. Tunnel 135 feet long. A 10-stamp mill on the property.

Idle. Garfield Consolidated Mining and Milling Company, Tuolumne, owner. F. H. Rood, superintendent.

Gem Mine (quartz) is 7 miles northeast of Confidence, on the north fork of the Tuolumne River. Comprising the following claims—Gem, Representative, Senate, Edith, Congress, Assembly, Iola, Faith placer mine, Hope placer mine, Charity placer mine, controlling an area of 320 acres.

The Gem vein strikes N. 65° E., dip 65° SE. and the Senate vein has a course of N. 15° W., dip 60° NE. The formation is granodiorite. The veins have an average width of 18 inches. The ore, occurring in the form of kidneys, is free milling, containing pyrite and galena.

Developments consist of a crosscut tunnel 380 feet in length intersecting the vein 230 feet from mouth of tunnel, with a drift 125 feet east and 75 feet west on vein, with a winze 50 feet deep on Gem vein. Above lower tunnel there is a tunnel 150 feet long on Senate vein. There is a 10-stamp mill on property, driven by water power. Ten men are employed. J. F. Wulzen, of Confidence, owner and manager.

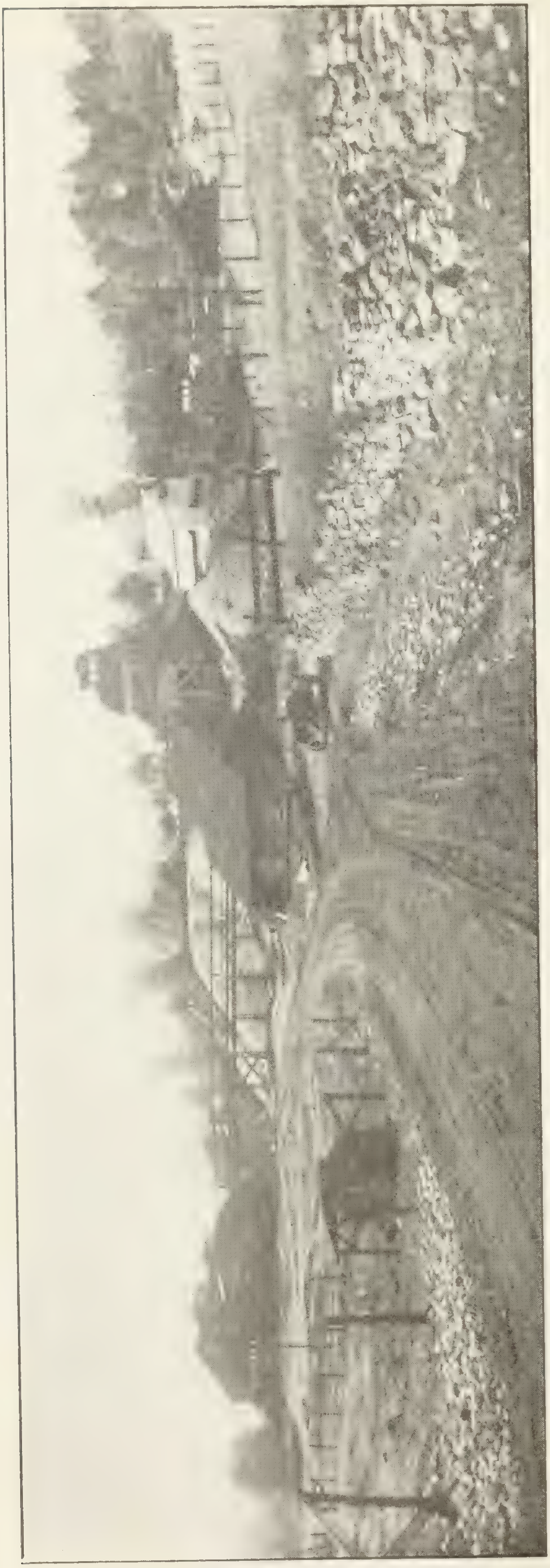
Gladstone Mine (quartz). (See Report XI, p. 510.) It is on Kanaka Creek, 1 mile east of Jacksonville. Idle. Thomas Whitto et al., of Sonora, owners.

Golden Gate Mine (quartz). (See Reports X, p. 738; XI, p. 511; XII, p. 302.) Situated ½ mile south of Sonora, on ridge east of Woods Creek. The course of vein is N. 35° E., dip 65° E., and averaging in width about 4 feet. Both walls are slate. The mine is opened by a shaft and tunnel, the tunnel being run northeast 1100 feet on vein. The shaft is 750 feet deep, on 65° incline.

A drain tunnel 1000 feet north on vein connects with shaft on the 100-foot level. Drifts are driven on the vein north and south of shaft every 100 feet, to the 700-foot level. Winze 200 feet deep on 700-foot level north of shaft. Steam hoist and 20-stamp mill on the property. Idle. Andrew McCormick, of Stockton, owner.

Green Mine (quartz). Located 3 miles northeast of Confidence, on ridge north of the north fork of the Tuolumne River. The strike of vein is north and south, dip 30° E., in granodiorite. There is a shaft 400 feet deep on vein. Steam hoist and 10-stamp mill on property. Idle. Thos. Magee & Sons., of San Francisco, owners.

Harvard (Trio) Mine (quartz). (See Report X, p. 53; Bull. 18, p. 130.) Situated 1 mile southwest of Jamestown, on the southeast slope of Whiskey Hill. Holdings consist of the following claims: McCann, Mooney, Trio, Sobrante, and Mooney Mill Site, having a total area of 80 acres. Length along the lode of 5000 feet. Three veins called east, central (or boulder), and west, have been exploited. These veins have a course of N. 37° W., dip 60° NE. The lode—which is very



The Harvard Mine, showing hoist and mill. Jamestown, Tuolumne County, California.

prominent, forming the central portion of Whiskey Hill—on the north end of the Trio claim shows massive quartz croppings, having a width of 100 to 300 feet. Average width of veins is about 10 feet. The central vein consists partly of a body of solid quartz from 6 to 12 feet thick, and as a rule the values are too low grade to mine. The east and west veins are in the form of stringer leads, consisting of a mass of quartz stringers cutting the schist, carrying more or less free gold and sulphurets.

The main footwall of the lode is serpentine with a hanging-wall of Calaveras slates. Ore shoots occur west of central vein with a trend toward the north. On the south end of the ore body a high-grade shoot of ore 100 feet long by 3 feet wide is encountered on the contact between the slates and serpentine. There are seven distinct ore shoots developed on this property, with average length of 200 feet and a width of 6 feet.

Work is carried on through a 3-compartment shaft (5′x 5′ each), 1650 feet deep, which is vertical to the 700-foot level, the remaining distance being sunk on 58° incline. Underground workings consist of drifts north and south on east and west veins on the following levels: 200′, 500′, 700′, 800′, 950′, 1100′, 1250′, and 1400′; total amount of underground drifts and crosscuts being 18,000 feet.

The veins are faulted on the south end of ore body between the 1200-foot level and the 1400-foot level, and on the north end between the 1100-foot level and the 1200-foot level; faulted 8 to 25 feet to the southwest, strike of fault being N. 35° W., dip 15° NE. Ore is mined by shrinkage system of stoping, with chutes at 20-foot intervals. Ore pockets are in hanging-wall of shaft, capacity being from 100 to 200 tons each.

Mine equipment: 300 h.p. double-drum electric hoist; 1100 cu. ft. and 800 cu. ft. Rix compressors, both electrically driven; auxiliary steam plant, consisting of three 100 h.p. boilers and 200 h.p. double-drum hoist. Ore hoisted in 2-ton skips and crushed by two 9″ x 16″ Blake crushers, driven by 75 h.p. motor. Ore hauled from bins at headframe a distance of 600 feet by 15 h.p. electric motor, hauling two 1½-ton cars.

Mill: 60-stamps, weighing 1200 pounds apiece, drop 7 inches, 100 drops per minute, crushing 5 tons per stamp, through 40-mesh. Stamps driven by two 75 h.p. motors. Pulp from batteries concentrated by twenty-four 6-foot Johnston vanners, driven by 35 h.p. motor. An extraction of 86% is made in mill. Concentrates assay $30 per ton. Force of 116 men employed. Harvard Mine (Inc.), 141 Milk street, Boston, Mass., owner. W. B. Buckminster, general manager; H. W. Gould, superintendent.

Hazel Dell Mines (quartz). (See Report XIII, p. 481.) They are 9 miles north of Soulsbyville, and consist of the Esterbrook, Evans and

Hazel Dell. Workings caved. William Sharwood, of Soulsbyville, owner.

Henrietta Mine (quartz). (See Report XII, p. 302). It is on the north fork of the Tuolumne River, 4 miles northeast of Tuolumne. C. F. Haslam, of Sonora, owner.

Hope Mine (quartz). It is on the Bonanza lead, ½ mile east of Sonora. The vein strikes N. 85° E. with a dip of 23° W. The footwall is a mica schist with a porphyry hanging-wall. Average width of vein is 2 feet. A tunnel has been driven across the mica-schist formation, cutting the vein 330 feet from the portal with a drift 200 feet east and 100 feet west on the vein. Total length of crosscut tunnel, 460 feet. At 93 feet above lower tunnel there is a crosscut tunnel 850 feet long, with a drift on vein 700 feet to the east and 150 feet west. Eight men are employed driving lower tunnel to crosscut footwall vein, also grading for a 5-stamp mill. Hope Mines Development Company, Boston Building, Salt Lake City, Utah, owner.

Imperial Mine (quartz). Situated 1 mile east of Jacksonville, on ridge west of Kanaka Creek, comprising the following group of claims: Imperial, Two Pardners, Miniokus, Rebate, Gladis L., The It, and Poodle Dog, area being 400 acres. Wide ore zone of mineralized slates cut by numerous veins and stringers of quartz, carrying gold values and auriferous pyrite. General course of vein is N. 45° W., dip 65° NE. The footwall is slate, and a hanging-wall of amphibolite schists. Developments consist of a shaft 216 feet deep, and a series of crosscut tunnels from 50 to 100 feet in length. Steam hoist and 10-stamp mill on property. Idle. Imperial Gold Mining Company, San Luis Obispo, owner.

Jumper and Golden Rule Mines (quartz). (See Report X, p. 50; MIN. RES. W. ROCKY MTS., 1871, p. 33, and 1872, p. 62; Bull. 18, p. 131,) Situated 4 miles south of Jamestown, near the town of Stent. The property comprises Jumper, New Era, Golden Rule, and Bogan Ranch (Agr. Pat.). In the Jumper mine the gold occurs in a dike accompanying the amphibolite schist and in small veins and stringers cutting the schist; width of zone varies from 5 to 50 feet. Ore is free milling with 2% pyrite and often the telluride, petzite occurs with free gold. This mine is different from other properties on the lode, in that it has no continuous ore shoots.

Noted for rich pockets of coarse gold found on west side of diorite dike which accompanies the vein. Course of vein N. 16° W., dip 70° NE. The footwall of the vein is a hard altered diorite and serpentine, with a diorite and diabase hanging-wall.

Property developed through three incline shafts to following depths: New Era shaft, 1400 feet; Golden Rule shaft, 500 feet; West Vein shaft, 200 feet. Winze from 1400-foot level of New Era workings sunk on vein to a depth of 400 feet; from the 493-foot level of Golden Rule workings, a winze sunk on a 70° incline on vein 800 feet deep. The underground workings on these properties are very extensive. Present work confined to sinking a shaft on the west vein, where a large low-grade body of ore has been developed. Property is equipped with air and electricity.

Mill: Two 10″ x 20″ Blake crushers, driven by 40 h.p. motor; 40-stamp mill, of which only 20 stamps are under operation, weight of stamps being 1000 pounds, dropping 100 drops per minute through 6 inches and crushing 3 tons per stamp. No concentrators are used, there being only two Union concentrators in mill, for testing purposes. Mill driven by 50 h.p. motor. Men employed, 28. Jumper California Gold Mines Company, 5 Rue Blanche, Paris, France, owner. L. S. Grant, general manager.

Kanaka Mine (quartz). (See Reports VIII, p. 669; XII, p. 303.) It is 5 miles northeast of Groveland. The course of vein is N. 10° E., dip 45° E. The formation is a hard black siliceous slate. Vein has an average width of 2 feet. Developments consist of four tunnels driven on vein. Main tunnel 1185 feet long. At 240 feet from mouth of tunnel a winze was sunk to a depth of 225 feet, and 700 feet south of first winze there is another winze 400 feet deep. There is a 10-stamp mill on the property. Idle. Mrs. Agnes Parr, of London, England, owner.

Keltz Mine (quartz). (See Reports VI (Part II), p. 59; X, p. 755; XI, p. 504; XII, p. 303.) It is 16 miles northeast of Columbia, in the canyon of the south fork of Stanislaus River. The course of vein is north and south, dip 45° E.; occurring in the slates and quartzites of the Calaveras formation. The mine has been opened up by a shaft 300 feet deep, and three tunnels driven on vein—1500 feet, 800 feet, and 400 feet. A 10-stamp mill is on the property. Idle. Keltz Mining Company, owner.

Kriss-Kross Mine (quartz). (See Report XII, p. 303.) It is a pocket mine 1 mile west of Priests. Idle. J. J. Hughes, of Chinese Camp, owner.

Lady Washington (see *United Mines.*)

La Guria Mine (quartz) is a prospect at Groveland. Shaft 125 feet deep. Idle. A. DeFerrari, of Groveland, owner.

Lamphere Mine (quartz). (See Report XI, p. 303.) It is at Confidence, adjoining the Confidence mine on the north. Shaft 480 feet deep. Caved. Richard Chute, of Sonora, owner.

Laura and North Star Mines (quartz). (See Reports XI, p. 498; XII, p. 303.) Situated 1 mile north of Tuolumne, on ridge east of Cherokee Creek. On the Eureka-Dead Horse lead in mica schist. Course of vein N. 35° W., dip 50° NE. and has an average width of 5 feet. Developments consist of two shafts—Laura shaft, 436 feet; North Star shaft, 400 feet deep. The quartz is free milling with a small percentage of pyrite and galena. Idle. T. M. Ashton, of Tacoma, Wash., owner.

Lead Mine (quartz). (See Report X, p. 56.) It is ½ mile west of Tuttletown. The pay rock is found in a mass of ankerite and mariposite between walls of amphibolite schist. Shaft 150 feet deep. Idle. W. B. Clement, of Tuttletown, owner.

Lewis Mine (quartz) is a pocket mine 2 miles north of Sonora, on the west slope of Bald Mountain. The course of the vein is N. 60° E., dip 65° NW., with width of 8 inches to 2 feet. Developments consist of a shaft 200 feet deep and four tunnels driven on vein, the lowest tunnel being 1200 feet in length. Two men are employed. William M. Lewis, of Sonora, owner.

Longfellow Mine (quartz). (See Reports VIII, p. 672; XI, p. 494.) At Big Oak Flat, adjoins the Mack Mine on the west. The formation is slate. There are two veins 50 feet apart, the footwall vein being 10 feet wide, and the hanging-wall vein 5 feet in width. The course of the veins is east and west, with dip 30° N. Shaft sunk on vein to a depth of 900 feet, with levels at every 100 feet. The ore shoots trend to the east. Ore free milling, containing coarse gold with 1% pyrite. There is a hoist, compressor and 25-stamp mill on the property. Two men employed keeping out the water. Longfellow Gold Mining Company, First National Bank Building, Monterey, owner.

Los Angeles Mine (quartz) is 6 miles south of Tuolumne, on ridge east of Tuolumne River. An east and west vein, with a dip of 80° N. in Calaveras formation. Average width of vein, 4 feet. Developments consist of three tunnels and a shaft 150 feet deep on vein. A lower tunnel has been driven on vein 500 feet. At a vertical distance of 350 feet above lower tunnel there is a tunnel 150 feet in length on vein, and 250 feet above the latter is still another 175 feet long. A 5-stamp mill on property. Idle. J. S. Kuns, of Los Angeles, owner.

Louisiana Mine (quartz) is 2 miles northwest of Tuolumne, on the Tuolumne and Soulsbyville road, comprising the following claims: Louisiana, Parker and Mason, and Lebiation; total area, 50 acres. The average width of vein is 18 inches; in granodiorite. Course of vein is N. 15° E., dip 70° SE. The ore is base, containing free gold associated with pyrrhotite, marcasite, sphalerite and galena. Developments consist of a shaft sunk on vein to a depth of 520 feet, with drifts north and south on 100′, 133′, 208′, 295′, and 417′ levels. A series of diorite dikes cuts the vein, with widths of 6 inches to 12 inches. Two ore shoots developed, the shoot north of shaft 100 feet long, that to south of shaft 180 feet long; both have an average width of 18 inches. Nine men employed sinking shaft. Louisiana Development Company, 606 Electric Building, Cleveland, Ohio, owner; Clarence Woods, manager.

Lucky Boy Mine (quartz) is 6 miles south of Tuolumne, on north fork of the Tuolumne River. Course of vein northeast and southeast, dip 80° SE. Average width of vein, 18 inches, with a limestone hanging-wall and slate footwall. Two tunnels driven on vein, 125 feet and 100 feet in length. Idle. C. F. Stucki, of Groveland, owner.

Lumsen Mine (quartz). (See Reports XI, p. 494; and XII, p. 303.) Idle. D. Lumsen & Son, of Big Oak Flat, owners.

Mack Mine (quartz). At Big Oak Flat, comprises the Mack, Wooden, Two Brothers, and Little Sisters. The course of vein is east and west, dip 36° N. Partly in the quartz-diorite and mica schist formations. The vein averages about 5 feet in width. To the east of New Mack shaft both walls of the vein are in the quartz-diorite, while to the west the vein is in slate. There are two parallel veins on the property, but most of the work has been on the Mack-Longfellow vein. The New Mack shaft has been sunk to a depth of 700 feet on the vein, and is 270 feet east of Old Mack shaft, which is 450 feet deep. Drifts have been driven on the vein every 100 feet to the 600-foot level. The ore is free milling, containing about 1% pyrite and some galena, and occurs in lenses. Below the 600-foot level the vein is in slate. Ore raised from new shaft by 50 h.p. hoist, driven by air. The air for drills and hoist is furnished by 6-drill 2-stage Llewellyn Iron Works compressor, driven by 100 h.p. motor. Ore trammed from ore bins to mill, where broken by two 10″ x 20″ Blake crushers. From crushers, fed by Challenge ore feeders to 20 stamps, weighing 1000 pounds per stamp, dropping 6 inches, 100 drops per minute, and crushing 3 tons per stamp through 40-mesh. Pulp from batteries treated by four 6-foot Frue vanners. Mill driven by 75 h.p. motor. Electric power furnished by Pacific Gas and Electric Company. Seven men employed. Big Casino Gold Mining Company, Call Building, San Francisco, owner.

Mangante Mine (quartz) is situated at Jamestown, on ridge northeast of Woods Creek, on vein east of main Mother Lode vein. Course of vein N. 10° W., dip 65° NE., averaging 5 feet in width. Shaft 150 feet deep. Steam hoist and compressor on property. Idle. Central Mother Lode Mining Company, 401 J street, Sacramento, owner. J. P. Mangante, agent.

Mascot Mine (quartz). Prospect, ½ mile south of Jamestown, on vein east of Mother Lode vein. Shaft 45 feet deep. Two men employed sinking shaft. D. L. Mann, of Jamestown, owner.

Mayflower Mine (quartz). (See Report XIII, p. 491.) It is ½ mile southeast of Tuolumne, on ridge west of north fork of the Tuolumne

River, and comprises the following claims: Mayflower, Lena Belle, Mohican, Young America, Georgia, Buckeye. There are three crosscut tunnels on property to vein (lower tunnel 527 feet long, crosscutting vein 300 feet from portal), with a drift south 1300 feet and north 300 feet. At a distance of 125 feet from mouth, a drift was run 580 feet south and 100 feet north on a parallel fissure. Course of vein is N. 35° E., dip 60° SE. Formation is a mica schist. Idle. W. H. Scott, of Tuolumne, owner.

Mazeppa Mine (quartz). (See Report XI, p. 509.) It is 1 mile southeast of Stent. Vein is 5 to 20 feet wide in Calaveras slates. The footwall is serpentine and hanging-wall slate. Course of vein is N. 16° W., dip 65° NE. Incline shaft 800 feet deep sunk on vein. Compressor, electric hoist and 10-stamp mill on property. Idle. Frank B. Keever, Sharon Building, San Francisco, owner.

McAlpine Mine (quartz). (See Report X, pp. 43, 44.) It is 4 miles northwest of Coulterville. Idle. McAlpine Gold Mining and Milling Company, 820 Foxcroft Building, San Francisco, owner.

Miracle Mine (quartz) is a prospect west of Groveland, on east and west vein in slate formation. Shaft 100 feet deep; tunnel 160 feet long. Idle. J. B. DeMartini, of Groveland, owner.

Moccasin and Golden Key Group of Mines. Situated 9 miles southeast of Jacksonville, on Jackass Creek. Course of vein N 45° W., dip 65° NE. The vein has an average width of 5 feet, with serpentine footwall and a meta-diabase hanging-wall. Developments consist of a tunnel 1400 feet long driven on vein. Five men employed. Moccasin Consolidated Gold Mining Company, 626 Hearst Building, San Francisco, owner. Joe Penrose, superintendent.

Mohican Mine (quartz). Situated 8 miles south of Tuolumne, in canyon of the Tuolumne River. Comprises the following claims: Lilian No. 1, Lilian No. 2, Oakland, North Star, Golden Eagle; area 97 acres. The general formation is a mica schist. The course of the vein is N. 30° W., with a dip of 25° NE.; and has average width of two feet. Six tunnels have been driven on the vein to the south as follows: 900-foot tunnel level, 540 feet; 931-foot tunnel level, 1162 feet; 981-foot tunnel level, 312 feet; 1016-foot tunnel level, 1125 feet; 1161-foot tunnel level, 236 feet; 1200-foot tunnel level, 100 feet. On the 931-foot tunnel level there is a winze sunk on the vein 525 feet deep, at a distance of 400 feet from portal of the tunnel. The ore is free milling, with only a small percentage of pyrite. Ore forms in lens-shaped ore bodies. There is a 5-stamp mill on the property. Two men are employed prospecting the ground. Mohican Milling and Mining Company, 401 Alaska Commercial Building, San Francisco, owner. R. E. McHale, agent.

Moody Mine (quartz). At Big Oak Flat on Longfellow vein. Shaft 240 feet deep. Idle. W. A. Nevills Estate, owner.

Mormon Mine (quartz). At Big Oak Flat, on ridge south of Rattlesnake Creek. Two tunnels on vein 100 feet, 200 feet in length. Idle. G. B. Musante. of Big Oak Flat, owner.

Mount Jefferson Mine (quartz). (See Report XII, p. 304.) It is at Groveland, and in mica schist. The course of vein is N. 75° E., dip 75° NW. East shaft is 600 feet deep, west shaft 300 feet. Vein drifted on east and west on 100′, 200′, 300′, 400′, and 500′ levels. There is a 20-stamp mill on property. Idle. Mount Jefferson Mining and Exploration Company, Humboldt Bank Building, San Francisco, owner.

Mount Vernon Mine (quartz) is 2½ miles northeast of Confidence. There are four crosscut tunnels to the vein. Idle. Fred Sutton, of Sonora, owner.

Never-Sweat Mine (quartz). (See Report XII, p. 304.) It is 1 mile northeast of Priests. Tunnel 300 feet long. Idle. James Ballentine, of Big Oak Flat, owner.

New Albany (see *United Mines*).

Nonpareil Mine (quartz). Is 1 mile west of Groveland, on a stringer lead 40 feet in width, consisting of a mass of quartz stringers cutting schists. The course of vein is due east and west, with a dip 65° N. Development includes a shaft 250 feet deep. Crosscut tunnel 700 feet long connects with shaft at 250-foot level. There is a 10-stamp mill on property. Idle. George Smith, H street, San Francisco, owner.

Norwegian Mine (quartz). Situated ½ mile southeast of Melones, on the north slope of Jackass Hill. Worked as a pocket mine. Course of vein is N. 12° W., with a dip of 54° E., and an average width of 4 inches, occurring in hard amphibolite schist, being tightly frozen to the walls. Work carried on through an incline shaft, 550 feet deep. Two men employed mining a high-grade streak. The ore extracted from this mine is noted for its rich tellurides. Norwegian Consolidated Mining Company, Pacific Building, San Francisco, owner. H. A. Homline, agent.

O'Donnell Mine (quartz). Prospect, 1 mile south of Jamestown, on ridge east of Woods Creek. Crosscut tunnel 450 feet long. Shaft 30 feet deep. A 5-stamp mill on property. Idle. E. R. Elliott, of Modesto, owner.

O'Hara Mine (quartz). It is 1 mile north of Sonora, on the west of Woods Creek. Has limestone footwall with mica schist hanging-wall. The course of vein is N. 85° E., dip 15° NW.; width 8 to 18 inches. Shaft sunk on vein 800 feet. Idle. J. F. O'Hara, of Sonora, owner.

O. K. Mine (quartz). (See Report XI, p. 508.) It is 3 miles northwest of Jamestown, adjoining the Tarantula mine on northwest. Vein 4 feet wide, having Calaveras slate hanging-wall and a diabase footwall. Course of vein N. 35° W., dip 42° SW. Crosscut tunnel 380 feet long intersects vein 140 feet below outcrop of vein. Drifted on vein 140 feet south and 200 feet north. Several shallow shafts sunk on vein. Four men are employed driving north drift. Under lease to B. H. Wood. Chas. H. Segerstrom, of Sonora, owner.

Old Dominion Mine (quartz). Situated 1½ miles northwest of Columbia, occurs in slates of Calaveras formation, on an east and west vein, dipping 65° N. Developments consist of shaft 70 feet deep and two tunnels, 240 and 110 feet in length. A 2-stamp mill on property. Five men employed. G. F. Grant, of Columbia, owner.

Old Tuolumne Mine (quartz). (See Report XII, p. 305.) On the south fork of Stanislaus River, 4 miles north of Columbia. Idle. Levy Bros., of San Francisco, owners.

Omega Mine (quartz). It is 2 miles northwest of Jamestown, on the north slope of Table Mountain. The vein occurs between the serpentine on the west and Calaveras slates on the east. The course of vein is N. 35° W., dip 62° NE. The vein material is quartz, dolomite and mariposite, showing free gold and 2% pyrite. Incline shaft 630 feet deep in footwall of vein. On 127-foot level crosscut 100 feet east to vein and a drift 500 feet south on vein. On 307-foot level the vein was cut 120 feet east of shaft and a drift driven 200 feet south. On the 457-foot level, crosscut intersects vein 160 feet east of shaft, and there is a drift on the vein 175 feet south. Mine equipment consists of steam hoist and 4-drill Leyner compressor.

Mill: A 9″ x 16″ Blake crusher, 20-stamp mill, 1050-pound stamps, eight 6-foot Frue vanners. Mill driven by 60 h.p. motor. Idle. C. W. Ayers, Mathew Harter, owners, Taft, Kern County.

Ophir Mine (quartz). (See Report XII, p. 305.) One mile north of Big Oak Flat. Idle. James Bros., of Groveland, owners.

Patterson Mine (quartz). (See Reports VIII, p. 656, and X, p. 56.) It is ½ mile north of Tuttletown, on southwest slope of Jackass Hill. The course of vein is N. 35° W., with a dip of 65° NE., average width 5 feet. Work was carried on through an incline shaft 820 feet deep, and through a crosscut tunnel 1250 feet long, which intersected the shaft at vertical depth of 85 feet from the surface. Workings consist of seven levels 100 feet apart, and the vein was drifted on both north and south of shaft. Two shoots of ore developed, having an average width of 5 feet. Idle. Chas. Fitzgerald, William McCrim et al., of Jamestown, owners.

Peña Blanca Mines (quartz). (See Report XIII, p. 488.) They are 1½ miles west of the Rawhide mine. Idle. Dr. J. L. Ross et al., of Redwood City, owners.

Providence Mine (quartz). (See Bull. 18, p. 138, by W. H. Storms.) This property is 2½ miles southeast of Tuolumne, in the canyon of the north fork of Tuolumne River. Comprises 90 acres, including the following claims: Providence, Good Enough, Consuello, East Consuello, and East Providence. The vein occurs in the black Calaveras slates near the surface, but in depth has a black slate on footwall with a granodiorite and limestone hanging. The vein has an average width of 5 feet. Course of vein is N. 8° E., dip 45° E. Two parallel veins on property. From the surface to the 700-foot level all drifts north and south of shaft are on the footwall vein, while from the 700-foot level to the 1100-foot level they are on the hanging-wall vein. The ore is free milling, with 2% pyrite and galena. Developments consist of a shaft 1300 feet deep, sunk on the footwall vein, with levels at every 100 feet from collar of shaft, and drifts north and south on vein. Water supply to run mill and hoist is brought from Duck Wall Creek in 2½ miles of ditch; capacity of ditch, 100 miner's inches, with 550-foot head at mill.

Mill: 10″ x 20″ Blake crusher, 10 stamps, weighing 1050 pounds per stamp, dropping 6 inches, 100 drops per minute, crushing 3 tons per stamp through 40-mesh screen; pulp from batteries treated by two Wilfley tables. Concentrates run $90 to $100 per ton. Twelve men employed. New Providence Gold Mining Company, 2041 Emerson street, Berkeley, owner. J. F. Chapman, superintendent.

Puerto-Fino Mine (quartz). (See Report XII, p. 499.) It is ½ mile northwest of Tuolumne. Idle. William Sharwood of Soulsbyville, owner.

Rappahannock Mine (quartz). (See Report XII, p. 306.) Situated 2 miles northwest of Jamestown, adjoining the Rawhide mine on the northwest. An incline shaft was sunk to a depth of 1150 feet in the serpentine footwall. Crosscuts were run from the shaft to vein on 350-foot level a distance of 250 feet east. On 600-foot level a crosscut was driven east 140 feet to vein, and east into slate hanging-wall an additional distance of 100 feet. On 1100-foot level a drift was driven 295 feet east, crosscutting vein and hanging-wall slates. Course of vein is N. 35° W., dip 65° NE., average width of vein material being 20 feet. There are boilers and large steam hoist on property. Idle. Richard Chute, of Sonora, owner.

Rawhide Mine (quartz). (See Reports X, p. 54; XI, p. 507; XII, p. 306.) Situated 2 miles northwest of Jamestown, to the north of Table Mountain. The main vein occurs on the contact between the serpentine on the west and Calaveras slates on the east, and is about 70 feet wide. It strikes N. 34° W. and dips 62° NE. The slates dip 75° NE. This vein is composed of dolomite, quartz and mariposite. The vein that was worked lies on footwall side of main vein, being separated from it by a thin gouge. This vein had an average width of 20 feet. The ore shows free gold and pyrite in a gangue of quartz, dolomite and mariposite.

South shaft or main working shaft was sunk on vein to a depth of 2000 feet on a 62° incline. About 1000 feet north of south shaft there is an incline shaft on vein 400 feet deep. Levels were driven on vein north and south every 100 feet. The underground workings consist of many miles of drifts. Ore shoots had a northerly trend. There is a large steam hoist and 40-stamp mill on the property. North shaft is now being unwatered, preparatory to making an examination of the property. The gold production from the Rawhide mine is reported to have been $6,000,000. Six men employed. T. W. Patterson Estate of Fresno, owner. Alexander Chalmers, of Angels, agent.

Rawhide No. 2 Mine (quartz). Is first claim south of Rawhide mine. Idle. A. Hayward Estate, San Francisco, owner.

Red Jacket Mine (quartz). Is 1 mile east of Big Oak Flat, on the Mississippi-Eureka vein. Three tunnels have been driven on vein. Idle. V. J. Repetto, of Big Oak Flat, owner.

Republican Mine (quartz). (See Report X, p. 47.) It is ½ mile northwest of Jacksonville, on Woods Creek, comprising the Mammoth, Orcutt, Republican, Harrison, and White Oak claims. Three veins have been developed on the property—footwall, hanging, and central or boulder vein. A broad mineralized zone, consisting of veins or lenses of quartz cutting the schists; course of veins N. 40° W., dip 65° NE. Developments consist of an incline shaft 700 feet deep on the Republican claim, with levels at 200′, 300′, 400′, and 600′. The principal ore shoot developed was 500 feet long, with an average width of 12 feet. On the Mammoth claim a crosscut tunnel was driven 750 feet through the footwall country to vein, and drifts 150 feet north and 350 feet south. From tunnel level a winze 430 feet deep was sunk in the gouge on hangingwall of the boulder vein. Course of vein N. 45° W., dip 65° NE. The vein has a greenstone hanging and a slate footwall. About 200 feet above Mammoth tunnel there is a crosscut tunnel 500 feet to vein, which is connected with lower tunnel by a raise.

Mine equipment: At Republican shaft, 80 h.p. boiler, double-drum steam hoist, 12″ x 16″ compressor. There is a 20-stamp mill at the mouth of Mammoth tunnel. Idle. Republican Mining and Development Company, Mills Building, San Francisco, owner. F. F. McGovern, of Sonora, agent.

Rising Sun Mine (quartz). (See Reports X, p. 748, and XI, p. 502.) It is on Turn Back Creek, 3 miles northeast of Tuolumne. The course of vein is N. 18° E., dip 45° E. The vein has an average width of 12 inches. Hanging-wall is highly mineralized clay slate, with a foot-wall of siliceous slates. Upper tunnel 250 feet in length on vein. Lower tunnel driven across the formation 300 feet. Incline shaft 420 feet deep. There is a 5-stamp mill on property. Idle. William Mansfield, of Tuolumne, owner.

Riverside Mine (quartz). It is 11 miles northeast of Columbia, on the south fork of Stanislaus River. The vein occurs in siliceous schist of the Calaveras formation. The course is N. 30° W., dipping 58° NE., with average width of 5 feet. It was worked through four tunnels, the lower one being a crosscut 700 feet to vein with a drift northwest 1500 feet. Property idle; has not been worked for years. Edgar H. Williams et al., of San Francisco, owners.

San Guiseppe Mine (quartz). (See Reports VIII, p. 654; X, p. 749; XII, p. 306.) It is 1 mile west of Sonora. The vein occurs in amphibolite schist. Shaft 250 feet deep. Idle. Fred Sutton, of Sonora, owner.

Santa Ysabel Mine (quartz). (See Reports X, p. 51, and XII, p. 304.) Situated 2½ miles south of Jamestown, on southeast slope of Quartz Mountain. Controls the following claims: Knox and Boyle, Gray Eagle, Miller and Holmes, and Nyman, comprising 100 acres. General formation is amphibolite schist, ore being found on both sides of the main dolomite and talcose vein, in the form of numerous stringers cutting the Calaveras slates. A series of small greenstone dikes accompanies the vein. Average width of vein is about 6 feet; course N. 16° W., dip 65° NE. Mine developed by three incline shafts. No. 1 shaft is 830 feet deep, sunk in slate hanging-wall; three levels—400′, 600′ and 800′. On the 400-foot level, crosscut east to vein 200 feet, and drift south 500 feet; on 600-foot level, crosscut west 400 feet with a drift north 40 feet, no ore developed. No. 2 shaft, 600 feet south of No. 1, has a depth of 600 feet, cut vein at 400 feet; Knox and Boyle shaft sunk east of central (east) vein to a depth of 800 feet. Ore is free milling, containing 3% pyrite.

Mine equipment: 200 h.p. double-drum hoist, 15″ x 18″ Giant Duplex compressor. Electrically driven. Mill: 10″ x 20″ Blake crusher, 40-stamp mill, 1000-pound stamps, four 6-foot Frue vanners; driven by 75 h.p. motor. Idle. Santa Ysabel Mining and Milling Company, Boston, Mass., owner. C. E. Shafer, of Jamestown, agent.

Sell Mine (quartz). Situated 1 mile north of Sonora, on northwest slope of Bald Mountain. Worked as a pocket mine. Ore occurs in rich pockets on intersection of east and west crossing dikes with vein. The course of vein is north and south with a dip of 85° W. Tunnel driven on vein 1400 feet long. Two men employed. J. A. Sell, W. M. Sell et al., of Sonora, owners.

Seminole Mine (quartz). (See Report XIII, p. 491.) Situated ½ mile southeast of Tuolumne, on ridge west of north fork of the Tuolumne River. The vein has an average width of 3 feet, with a strike N. 35° E., dip 60° SE., cutting through a mica schist. The ore is free milling, with auriferous pyrite and galena. An incline shaft has been sunk on the vein to a depth of 336 feet, with levels at 85′, 151′ and 318′, from collar of shaft. Idle. Seminole Consolidated Gold Mining Company, 8 Queen street, Sheepside, London, England, owner. W. H. Scott, agent.

Silken Mine (quartz). (See Report XII, p. 306.) It is 1 mile northeast of Priests Hill. Idle. C. P. Hale, of Big Oak Flat, owner.

Snell Mine (quartz). (See Report XI, p. 505.) It is between Rose Creek and the Stanislaus River, 7 miles east of Murphy and 13 miles north of Columbia. There are two shafts, 100 and 150 feet deep. Idle. Col. Dorsey Estate, of San Francisco, owner.

Sonnet Mine (quartz). Located on Grant Ridge, 12 miles northeast of Columbia. The course of vein is N. 78° E., and dipping 70° SE., in the slates of the Calaveras formation. The ore shoots form on intersection of vein with north and south crossings. The character of the ore is a heavy sulphide containing free gold associated with the sulphides of iron, zinc and lead. The quartz carries as high as 5% sulphides. Average width of vein is 2 feet. Tunnel driven on vein 600 feet. At 260 feet from mouth of tunnel a winze has been sunk to a depth of 100 feet. At 150 feet from portal of tunnel a crosscut has been driven 100 feet north to a parallel vein, and a drift run 150 feet east and 150 feet west. There is a 5-stamp mill on property driven by 15 h.p. gasoline engine. Seven men are employed. R. C. Davis et al., of Columbia, owners.

Soulsby Mines (quartz). (See Reports VI (Part II), p. 59; X, p. 742; XII, p. 306.) They are at Soulsbyville, and comprise the Churchill, Johnson & Bradbury, Pennsylvania, Platt & Gilson and Soulsby mines. The formations are granodiorite and mica schist, with intrusive dikes of diorite. Two parallel veins on property, having a course of N. 15° E., and a dip of 68° E. The quartz carries quite a large percentage of sulphides of iron, copper, lead and zinc, containing gold. The veins have an average width of 2 feet. Three shafts were sunk on vein to the following depths: Davidson 700 feet, Central 850 feet, Pennsylvania 800 feet, vertical. Hoists, pumps, compressors and 20-stamp mill on the property. Idle. Bagdad-Chase Gold Mining Company, of Rochester, N. Y., owner.

Star Mine (quartz). It is 2 miles northeast of Columbia, on ridge south of Rose Creek. The course of vein is northeast and southwest, dip 45° SE., with average width of 2 feet. Work was carried on through a shaft 500 feet deep. The quartz is dark in color, being heavily sulphuretted, carrying sulphides of iron, lead and zinc, and coarse gold. There is a steam hoist, compressor and a 10-stamp mill on the property. Idle. E. A. Hayes, of San Jose, owner.

Starr King Mine (quartz). Situated 4 miles southeast of Tuolumne, adjoining the Providence mine on the south. The vein has an average width of 18 inches, with a slate footwall and a granodiorite hanging. The strike of vein is N. 35° E., dip 35° SE. Developments consist of an incline shaft on the vein to a depth of 496 feet. There is an electric hoist, compressor and 5-stamp mill on the property. Idle. Donald C. Kennedy, 545–553 Golden Gate avenue, San Francisco, owner.

Stonewall (*Pedro*) *Mine* (quartz). It is a pocket mine, situated 1 mile north of Sonora, on west slope of Bald Mountain. Series of shafts and tunnels on veins. Formation is a mica schist. Idle. William Pedro, of Sonora, owner.

Street Mine (quartz) is ½ mile north of Tuttletown, near Jackson Flat. Incline shaft sunk on vein to a depth of 300 feet. On 200-foot level, drift north 200 feet; on 300-foot level, drift north 900 feet. Steam hoist and 5-stamp mill on property. Idle. Richard Kinsman, 991 Sixty-first street, Oakland, owner.

Stuart and Morris Mine (quartz) is 1½ miles north of Sonora, on west slope of Bald Mountain. Stuart tunnel 500 feet long, Morris tunnel 900 feet in length, and three incline shafts from 200 to 500 feet deep. The course of vein is northeast and southwest, dip 10° NW., occurring in mica schist. Three men employed. Helen Wainwright, Frank Tomisson et al., of Sonora, owners.

Sugarman and Nigger Mines (quartz). (See Report X, p. 737.) Situated on the west slope of Bald Mountain, 2 miles north of Sonora. It is a pocket mine in mica schist of the Calaveras formation. The vein has a course of N. 57° E., and dip 60° NW. Two tunnels on the vein; lower tunnel 1800 feet in length, and 80 feet above it another one 500 feet long. The ore shoots or pockets occur near east and west granite crossings, which reefs are from 8 to 60 feet wide and dip to the south. Rich pockets are formed at the point where these crossings come in contact with the vein in a belt of black slate, also with quartz stringer feeders having same course as vein, but dipping faster into the main vein near a crossing. The quartz is free milling, containing coarse gold associated with tellurides of gold and silver. Two men are employed. C. F. Smith and C. R. Watson et al., of Sonora, owners

Tanzy Mine (quartz) is ½ mile east of Sonora, on the northwest slope of Bald Mountain. The course of vein is N. 35° W., dip 23° NW. Footwall is limestone and hanging-wall slate. Porphyry dike accompanies vein on hanging-wall side. Shaft 500 feet deep sunk on vein. Two men employed. J. F. O'Hara, of Sonora, owner.

Tarantula Mine (quartz). It is 3 miles northwest of Jamestown, adjoining the Alameda mine on the northwest. The vein is in the form of a mass of quartz stringers cutting the schist, having a width of 20 feet; course northwest and southeast with a dip of 65° NE. The footwall is serpentine and hanging-wall Calaveras slates. There is an incline shaft 900 feet deep on vein. Caved. Idle. Tarantula Gold Mining Company, H. W. Peabody & Company, 225 California street, San Francisco, owners.

Tarantula Mine (quartz). It is 2 miles northwest of Jacksonville, on Woods Creek, to the north of the Eagle-Shawmut mine, comprising the following claims: Tarantula, Omega, Western Extension, and Tarantula Hawk, area 60 acres, giving 1829 feet on the lode. Stringer ore deposit on the main Mother Lode belt, consisting of east, boulder, and west veins, in a belt of Calaveras slates, having a serpentine footwall with a slate hanging-wall. Ores are free milling, containing 2% auriferous pyrite. Course of veins N. 45° W., dip 65° NE. Heavy black slate gouge on hanging-wall of vein. Developments consist of crosscut tunnel 900 feet long, and three compartment winze sunk from tunnel level on vein to a depth of 640 feet with drifts driven north and south every 100 feet below tunnel. There are also fourteen tunnels on veins with a total amount of workings of 3124 feet.

Mine equipment: 100 h.p. direct-driven electric hoist; 10-drill compressor driven by 100 h.p. motor. Mill: No. 4 Kennedy gyratory crusher, driven by 25 h.p. motor, 20-stamp mill, 1250-pound stamps, driven by 75 h.p. motor, four 6-foot Frue vanners, and four Wilfley tables, driven by 15 h.p. motor. Idle. United Gold Mining and Milling Company, 13 bix Rue des Matherius, Paris, France, owner. J. Boue, secretary.

Trio Mine (quartz). (See Report X, p. 53.) It is 1¼ miles northwest of Jamestown. Idle. A. Hayward Estate, San Francisco, owner.

U. S. Grant Mine (quartz). It is 12 miles northeast of Columbia, on Grant Ridge. Developments consist of a crosscut tunnel 1000 feet long to vein and a shaft 96 feet deep. The formation is a mica schist. Vein averages 12 inches in width. Idle. Lake Superior and Nevada Development Company, 218 W. Superior street, Duluth, Minn., owner.

United Mines Group (quartz). (See Reports VIII, p. 665; X, p. 752; XI, p. 497; XII, p. 304.) Comprises the following claims: Eureka, Dead Horse, Lady Washington, Grizzly, North Albany, New Albany, Side

Wiper; total area being 400 acres. Workings consist of New Albany incline shaft 1050 feet, Dead Horse shaft 1800 feet, Grizzly shaft 1000 feet, Old Albany shaft 500 feet, Lady Washington upper tunnel 500 feet on vein, lower tunnel is a 2000-foot crosscut tunnel connected with Dead Horse shaft.

Operations are being carried on through the New Albany shaft, which is on a vein east of and parallel to the Dead Horse lead. Course of vein is N. 35° W., dip 55° NE. The vein has an average width of 5 feet. The footwall is a black plumbago slate and the hanging-wall granodiorite. The country rock is a mica schist. The Dead Horse lead was extensively worked through tunnels on Lady Washington and through shafts on Grizzly and Dead Horse claims. The ore is free milling, with 1% pyrite and traces of galena. The ore forms in lenses at the intersection of cross diorite dikes with vein. There is a slate casing between vein and hanging-wall of granodiorite. Two shoots of ore are developed, one north of shaft and the other to the south, having a length of 300 feet with an average width of 3 feet. Work is carried on through a crosscut tunnel 200 feet to vein, from which point a winze has been sunk on vein to the 700-foot level, and 600 feet south of this winze there is a winze 300 feet deep to 1000-foot level. The vein on this level has been driven on 125 feet south and a shoot of good ore developed. The underground workings show extensive amount of drifts, crosscuts and raises. The company owns the water rights on the north fork of the Tuolumne River. A ditch 8 miles long delivers water to mill and power plant with a head of 600 feet.

An Ingersoll-Rand compressor (22½″x 14″) (14″x 14″) furnishes air for hoists and air drills. Ore from tunnel delivered to mill over an incline tramway 500 feet in length in two 1-ton cars. Mill: 9″ x 15″ Blake crusher, 20 stamps weighing 1050 pounds per stamp and dropping 6 inches, 95 drops per minute, crushing 3 tons per stamp through 40-mesh screen; pulp from batteries to four 4-foot Frue vanners. The old company made an attempt to cyanide the ore, but without success; there is a 50-ton cyanide plant on property, consisting of a Dorr classifier, two Hardinge mills, two Dorr continuous slime thickeners, four Pachuca tanks, and solution tanks. Concentrates assay $25 per ton, and are shipped to Selby Smelting Works.

Property under lease to Paul Morris, of Tuolumne. Eleven men are employed. United Mines Corporation, 606 Electric Building, Cleveland, O., owner. Paul Morris, manager.

Vine Spring Mine (quartz). Situated 2 miles northwest of Columbia, on ridge east of the Stanislaus River. The formation is granodiorite. The course of vein is northwest and southeast with a dip of 60° NE., and an average width of 18 inches. Three tunnels have been driven on vein. Idle. S. Whetmore, J. V. Bannister et al., of Columbia, owners.

Wheal Ruff Mine (quartz) is 1 mile west of Soulsbyville, on Sonora and Mono road. On an east and west vein in the granodiorite. Vein dips 80° S. There is a vertical shaft 200 feet deep. Property under lease and bond to Tuolumne Syndicate, who are sinking the shaft. A 30 h.p. single-drum electric hoist and (16″ x 14″) (10″ x 14″) Ingersoll-Rand compressor on property. Thirteen men are employed. Thomas Richards and James Burns, of Soulsbyville, owners. R. C. Knox, superintendent.

Willietta Mine (quartz). (See Report X, p. 47.) It is a mile southeast of Jacksonville. Owned in Scotland. William Sharwood, of Soulsbyville, agent.

Wise Mine (quartz). It is ½ mile south of Tuttletown, on the southeast slope of Jackass Hill. The vein is in form of an irregular system of quartz stringers cutting the amphibolite schists, forming pockets at intersection of vertical stringers with stringers of slight dip. Course of vein N. 35° W., dip 65° NE. Tunnel driven on vein a distance of 375 feet. Four men employed. Stephen Davey and A. A. Swerer, of Tuttletown, owners.

GOLD MINES—PLACER.

Buckeye Channel (*Rosedale*) *Mine* (drift). It is 3 miles north of Jamestown, on the east slope of Table Mountain. On the Rosedale channel, having a course northeast and southwest. The bedrock is a soft Calaveras slate. The width of gravel is 60 feet, with a depth of 3 feet. The gravel is worked through incline shaft 325 feet deep. Twelve men are employed drifting on channel. W. F. Wilson, of San Francisco, owner.

Cherokee Gravel Mine (drift). Situated 1½ miles north of Tuolumne, on ridge west of Turnback Creek. Course of channel is northwest and southeast and is capped by andesite flow 400 feet thick. The bedrock is a decomposed granodiorite. Tunnel 400 feet long. Two men are employed retimbering tunnel. Cherokee Gravel and Gold Mining Company, Soulsbyville, owner. Andrew Scanavino, superintendent.

Columbia Basin Mine (drift). Situated ½ mile north of Columbia, in Columbia basin. On the Table Mountain channel. The course of channel is northwest and southeast, the gravel occurring in deep crevices of the limestone formation. The gravels are subangular, little worn and largely quartzose. Shaft 200 feet deep. Three men are employed unwatering mine. Columbia Basin Development Company, 652 Monadnock Building, San Francisco, owner.

Crawford Placer (hydraulic). Situated 1 mile northeast of Columbia, on Yankee Hill. Controls 420 acres on Woods Creek. Course of channel is northeast and southwest, having a depth of gravel of 10 to 80 feet, with a width of 2000 feet. T. C. Crawford, of London, England, owner.

Gold Ship Gravel Mine (drift). Situated 5 miles northeast of Groveland, on ridge north of Humbug Creek. Gravel capped by an andesitic breccia. The gravel is slightly cemented, containing boulders of andesite, quartz, quartzite and slate. Developments consist of an incline shaft 625 feet deep on west rim of channel: on the east rim a shaft was sunk on an incline to a depth of 150 feet. There is a Dodge rotary mill on property. Idle. Gold Ship Mining Company, Ray Building, San Jose, owner. W. J. Graham, manager.

Humbug Gravel Mine (drift). Situated 2 miles north of Jamestown, on the east slope of Table Mountain, on the Table Mountain channel. The channel is capped by basaltic flow 200 feet in thickness. Work is in progress on this property developing the Humbug and Rosedale channels. The Rosedale channel has an elevation of 12 feet above the Humbug channel and spills into the latter. These channels are developed through two incline shafts with depths of 365 and 325 feet. There is a drift 1676 feet long connecting the incline shafts. The course of channels is northeast and southwest. The width of gravel on Humbug channel is 200 feet, with a depth of 3 to 5 feet. The Rosedale channel has a width of 60 feet, with a depth of gravel of 5 feet. The bedrock is a soft slate. The gravel is cemented and free, composed of quartz, quartzite and andesitic boulders. There is an extensive amount of underground workings on the two channels. Six men are employed. California Company, 60 State street, Boston, Mass., owner. J. L. Whitney, manager.

Punchbowl Gravel Mine (drift). Situated 6 miles west of Jamestown, on southwest slope of Table Mountain. The course of channel is north and south, and is capped by 250 feet of basalt. Tunnel 1100 feet long being driven in Calaveras slate and diabase bedrock to cut below upper Table Mountain channel. Four men employed. Punchbowl Gravel Mining Company, Paris, France, owner. E. C. Shafer, general manager.

Saratoga Placer Mine (drift). Situated 1½ miles south of Columbia, on the east slope of Table Mountain. Course of channel northwest and southeast, width is 300 feet, with a depth of gravel of three feet. The bedrock is slate. Channel capped by a basalt flow 200 feet thick. Workings consist of an incline shaft 200 feet deep and a drain tunnel 1000 feet long, which intersects shaft at the 200-foot level. Three men are employed. Saratoga Mining and Development Company, 875 Willow street, Oakland, owner. J. F. Dieu, superintendent.

Stanislaus Gravel (If I Can) Mine (drift). Situated 12 miles southwest of Jamestown, on the Stanislaus River, on Table Mountain channel. Two channels have been developed, the pre-andesite channel (lower) and the andesite channel (upper). Channel capped by basalt flow 135 feet thick. Course of channel is northeast and southwest, width of gravel is about 100 feet with a depth of 8 to 15 feet. The bedrock is greenstone, hard and highly creviced. The gravel is partly cemented and free, containing boulders of quartz and andesite. The gravel is worked through a bedrock tunnel 1500 feet long, and treated in a Price disintegrating mill, having a capacity of 130 tons per twenty-four hours. Eleven inches of water are used in crushing gravel. Black sands are saved on No. 4 Deister table. Electric power is furnished by the Sierra and San Francisco Power Company. From 12 to 40 men are employed. Stanislaus Gravel Mining Company, 1010 Merchants National Bank Building, San Francisco, owner. A. G. Kullberg, manager.

Springfield Placer Mine (drift). Situated on ridge southeast of the Stanislaus River, near Columbia. Seven distinct channels have been developed on this property—Big Buchanan, Ranch, Fox, Clark, Rancheria, Barry, and Slaughter House. The main channel, called the Buchanan, enters the property on northwest corner, passing through the property in a southeast direction for a distance of 1¼ miles and is over 800 feet wide. These channels have been developed by three incline shafts; on the east slope of Table Mountain an incline shaft has been sunk to a depth of 240 feet, further south a shaft 900 feet deep on 18° incline, and 1100 feet west a shaft cuts the channel at a depth of 240 feet. On ridge above the Stanislaus River a 6000-foot tunnel is being driven under these channels. The formations are granite, slate and limestone. By means of this tunnel the company expects to drain the heavy flow of water encountered in the shafts, which prevented working the rich gravel found there. Air furnished for driving tunnel by two 12″ x 12″ Sullivan compressors. The gravel is treated in a Krogh gravel mill, having a capacity of 240 tons per twenty-four hours. Electric power is furnished by Sierra and San Francisco Power Company. Thirty men are employed. Springfield Tunnel and Development Company, Springfield, via Columbia, Cal., owner. A. L. Horner, manager; P. Cadematori, superintendent.

LIMESTONE AND LIME.

Pacific Lime and Plaster Company. This plant is situated 1 mile south of Sonora, in a belt of crystalline limestone in Calaveras formation, in Sec. 1, T. 1 N., R. 14 E. The holdings of the company comprise 180 acres. The limestone is being quarried from two large open cuts. The broken material is trammed or hoisted to five kilns, where lime is burned with oil. The capacity of the kilns is 20 tons each per twenty-four hours. The product of this plant consists of lime, limestone grits for chicken feed, and ground limestone for glassworks and agricultural hydrate for soils. The output is 225 barrels of lime per twenty-four hours. Thirty-five men are employed. Pacific Lime and Plaster Company, 807 Monadnock Building, San Francisco, owner. W. O. Badgley, general manager.

Sierra Lime and Cement Works. Situated 1½ miles south of Sonora, on ridge northwest of Sullivan Creek. The plant consists of three kilns of 20 tons capacity each. Idle. California Lime and Hydrate Company, 831 Monadnock Building, San Francisco, owner. W. A. Brown, president.

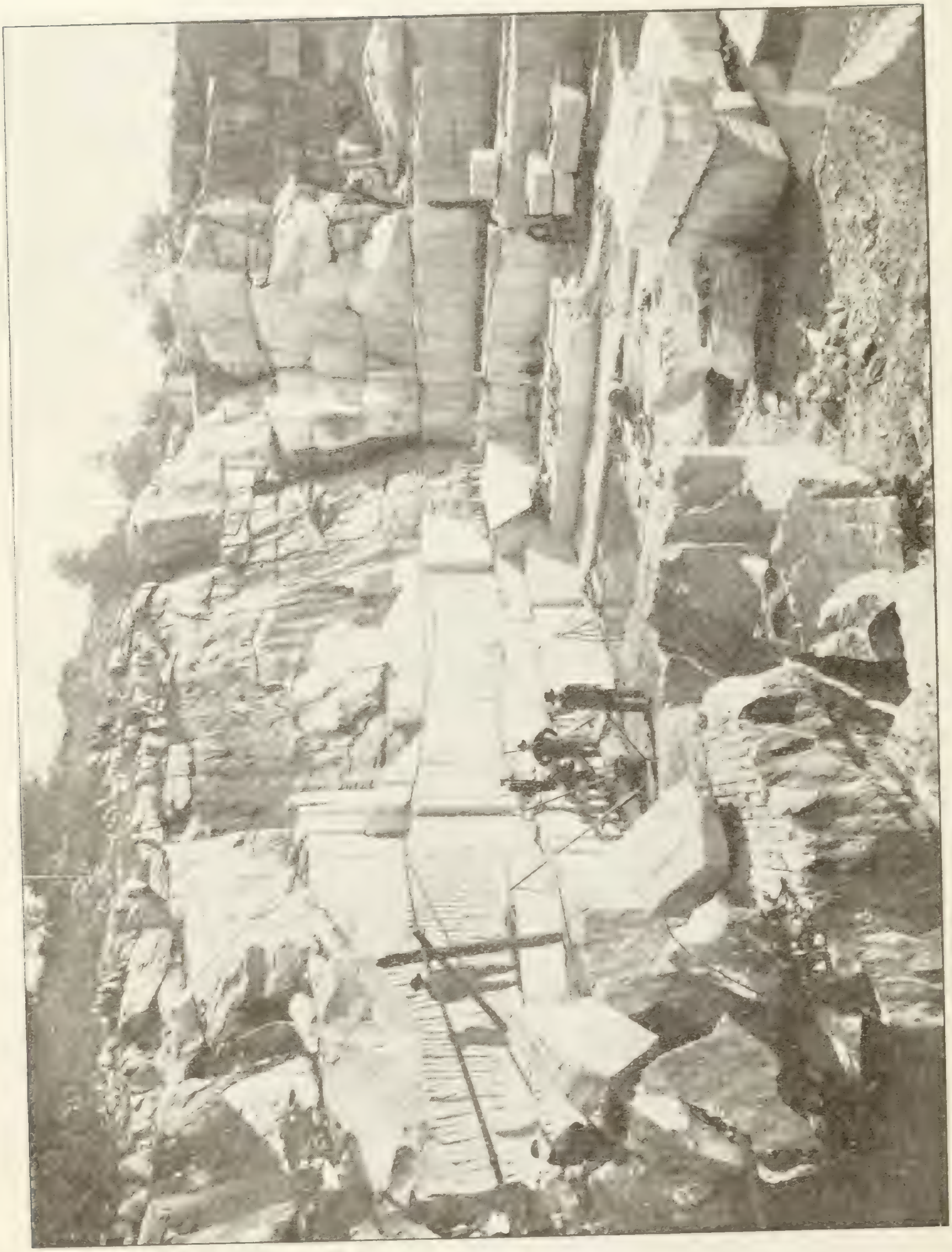
MARBLE.

Baxter Marble Quarry is 3 miles northwest of Columbia, to the south of the north fork of the Stanislaus River. Two quarries have been opened on this property, showing a good grade of marble. Idle. D. F. Baxter, of San Francisco, owner.

Columbia Marble Quarries. These quarries are situated 3 miles northwest of Columbia and 7 miles northwest of Sonora, on ridge southeast of the Stanislaus River. This company has been under steady operation since 1891, producing three grades of marble—medium, light and dark—and turning out a product that in beauty, durability and susceptibility to a brilliant polish is the equal of any in the United States. Besides the white, veined and black marble, it also produces a pretty blue marble, and a beautiful buff with red streaks, known as Portola. The marble is very hard, running as high as 11 cubic feet per ton, which makes it especially valuable as a durable stone. A body of marble 1 mile long with a depth of 800 feet and width of 200 feet has been developed, estimated at about 211,200,000 cubic feet.

The stone is quarried in blocks weighing 380 tons each, accomplished by cutting a vertical groove 10 feet deep around three sides, covering a space of 420 square feet. Then channeled holes 6 inches apart, 6 feet long, are drilled horizontally along the exposed vertical face on a line with the bottom of the groove. Then plugged and feathered. The block is subdivided into sections weighing 15 tons, which are hoisted from pit by means of derricks, and placed on cars and transported to the gangsaws.

Equipment: There are 8 Merriam gangsaws. A 25 h.p. motor drives three gangs, and 8 Francis sand pumps elevate sand to distributors for saws. A 360-cubic foot Ingersoll-Rand compressor furnishes air for



The Columbia Marble Quarry, Columbia, Tuolumne County, California.

Another view of the Columbia Marble Quarry, Columbia, Tuolumne County, California.

the drills. The company owns and generates its own electric power for lights and plant. Thirty-five men are employed. Columbia Marble Company, 268 Market street, San Francisco, owner. W. D. Bannister, manager.

Sonora Marble Quarry. In Sec. 25, T. 2 N., R. 14 E., 1 mile north of Sonora, on the Sonora and Columbia road. The marble is mainly a white crystalline dolomite; but some variegated varieties have also been developed. Waste product from quarry crushed for Terrazzo work. Equipment consists of one derrick (mast 50 feet high, boom 60 feet in length), 12″ x 12″ Ingersoll-Rand compressor, channelers, screws, rolls and crushers. The marble is being developed, and company plans to install a plant for dressing the stone. Employs 6 to 12 men. Sonora Marble Company, owner; Sullivan Brothers, 134 Haight street, San Francisco.

Warren Marble Quarry. In Sec. 35, T. 3 N., R. 14 E. The quarry and works are located about 3½ miles northwest of Columbia, on ridge south of the south fork of the Stanislaus River. The marble strip is 150 feet wide. The quarry face has been sufficiently opened to allow large quantities of any desired size of stone to be taken out. The pure white and variegated varieties have been developed. The marble is a compact, fine-grained, crystalline dolomite, free of iron and flint. Equipment consists of two 60-foot derricks, derrick hoist, channelers and compressor. Idle. Warren Marble Company, Merchants National Bank Building, San Francisco, owner.

PART II.

The Counties of

Colusa, Glenn, Lake, Marin Napa, Solano, Sonoma, Yolo

By WALTER W. BRADLEY, Field Assistant

INTRODUCTION.

The group of counties whose mineral resources are herewith presented is principally of that section of the State often referred to as "north of the Bay," lying adjacent to and immediately north of San Francisco Bay. A portion of the west side of the Sacramento Valley at its southern end is also included, as well as a portion bordering on the Pacific Ocean. This area includes the largest and most important mineral springs district of the State, and was also at one time a large producer of quicksilver, though to a lesser degree of recent years. Its yield of structural materials and building stone is also an important item, and growing.

The following report presents the results of four months of field work in the area described. But little geological detail was attempted, as it was desired to bring the economic data down to date without too much delay. We have listed as far as possible all mineral properties of whatever nature, their location, ownership, character of the deposit, method of working, equipment, and other information of interest.

We wish to acknowledge the uniform courtesy of the various operatives and owners in freely giving information as well as access to the numerous mineral properties visited.

COLUSA COUNTY.

Field Work in October, 1913.

Colusa County, like its neighbors, Glenn on the north and Yolo on the south, is one of the Sacramento Valley counties, with a portion of the Coast Range on its western edge. Its mineral resources are confined principally to the Coast Range section. Butte and Sutter counties bound it on the east, with Lake on the west. It has an area of 1100 square miles, with 65 square miles of the northeast corner lying on the east side of the Sacramento River. The upper branches of Stony Creek drain the northwest part of the county and Bear Creek the southwest, while several smaller streams traverse the eastern two thirds, to the Sacramento. Snow Mountain is at the northwest corner.

The eastern edge of the Coast Range is here composed of a series of sedimentary strata, principally sandstones, dipping at 45° to 75° to the east and under the valley alluvial deposits. Their strike is west of north. West of these are the metamorphic series. During the course of the field work I crossed the contact between the sedimentaries and the metamorphics at four separate points: about $\frac{1}{2}$ of a mile west of Stonyford; $2\frac{1}{2}$ miles west of Lodoga; $1\frac{1}{2}$ miles east of Cooks Springs; and about $\frac{1}{2}$ of a mile east of Wilbur Springs. Plotted on the map, these points are seen to be in a straight line, running about N. 20° W.

The mineral products of Colusa County, in the order of their production to date (see Table, page 4) are: Sandstone, mineral water, quicksilver, gold and silver, stone industry, salt, and brick. The total value is in excess of $2,600,000. In addition to these, occurrences of the following have been noted: Borax, coal, copper, chrome, gypsum, iron, limestone, mineral paint, natural gas, onyx marble, petroleum, and sulphur.

The actual output is in excess of that shown by the table, as the Manzanita mine is known to have been a gold producer as early as 1865. Also, high grade copper ore was shipped from the county in the early sixties. There are no available records of these values, nor for the quicksilver produced between 1877 and 1895.

ARAGONITE (see Onyx Marble).

BORAX.

Borax is an important constituent in some of the hot sulphur springs on Sulphur Creek, but it has never been extracted commercially from the waters.

Bibl.: R. III, p. 16; Bull. 24, pp. 69, 70.

TABLE OF MINERAL PRODUCTION.

Year	Gold and silver	Quicksilver		Sandstone		Mineral water		Stone industry	Miscellaneous and unapportioned
	Value	Flasks	Value	Cubic feet	Value	Gallons	Value	Value	
1875		700	$58,905						
1876		407	17,908						
1877		466	17,382						
1878									
1879									
1880	*$4,908								
1881	3,500								
1882	2,575								
1883	1,000								
1884	1,530								
1885	45,000								
1886	11,617								
1887	7,461								
1888	6,000								
1889	13,626								
1890	2,810								
1891									
1892									
1893	300								
1894				20,000	$7,500				
1895		1	40						40 tons, $400; salt.
1896		58	2,054			50,090	$12,530		
1897		43	1,510			31,500	1,620		8 tons, 160; salt.
1898						21,000	1,050		21 tons, 439; salt.
1899						5,000	1,120		20 tons, 300; salt.
1900		275	12,359			53,500	12,350		20 tons, 80; salt.
1901	1,800	235	10,575	88,981	80,082	92,200	20,220		18 tons, 270; salt. 270 M., 2,160; brick.
1902	850	605	26,100	99,395	87,456	142,305	79,698		18 tons, 393; salt.
1903		510	21,708	146,828	312,500	174,000	85,900		18 tons, 360; salt.
1904		†400	16,526	100,000	290,000	156,170	38,051	$1,250	18 tons, 180; salt. 300 M., 1,800; brick.
1905		326	12,321	118,954	276,908	160,000	80,000		18 tons, 225; salt.
1906				88,821	101,802	197,375	49,344		150 tons, 1,700; salt.
1907	742	17	648	86,954	78,259	254,075	51,233	3,500	16 tons, 240; salt.

1908	584	21	900	73,284	43,971	200,000	88,000	850	10 tons, 125; salt.
1909		11	545	47,070	24,634	150,000	75,000	620	
1910				112,947	56,505	150,000	75,000	16,500	
1911		5	230	101,029	50,027	136,300	68,150	16,702	1,596 unapp.
1912				51,137	15,804	165,330	39,061	15,300	
1913				34,927	15,550	132,720	32,931		
Totals	$104,303	4,080	$199,711	1,170,327	$1,440,998	2,271,565	$811,258	$54,722	$10,431

*1880 to 1890, U. S. Mint Reports.

†Flasks of 75 pounds since 1904; previously 76½ pounds.

Totals.

Gold and silver	$104,303
Quicksilver	199,711
Sandstone	1,440,998
Mineral water	811,258
Stone industry	54,722
Miscellaneous and unapportioned	10,431
Total to end of 1913	$2,621,423

BRICK CLAY.

At one time bricks were made at Colusa, but not of recent years.

Bibl.: R. VIII, p. 159; Bull. 38, p. 242.

CHROME.

Chromite is reported in T. 17 N., R. 6 W., by J. T. Rathbun, of College City.

Bibl.: Bull. 38, p. 362.

COAL.

Some development work was at one time done on several small lignite veins near Sulphur Creek, but nothing of consequence was found.

Bibl.: R. VII, p. 190; VIII, p. 158; X, p. 158; XI, p. 188.

COPPER.

Copper ore has been found at several points in the northwestern part of the county near Stonyford (formerly Smithville), and various claims have been located at different times. None of these are now extant except the two groups noted below, and only assessment work is done on them. About 1861 there was something of a copper excitement in this section and a small tonnage of sorted ore was shipped to the Selby smelter. A smelter was built at the mouth of Hyphels Creek, but it proved a failure.

Bibl.: R. V, p. 98; VIII, p. 159; X, p. 158; Bull. 50, pp. 159, 160.

Lion Mine. Frank Fender, Stonyford, owner. This group of two claims (originally four) is in Sec. 17, T. 17 N., R. 6 W., and was first located about 1861. The ore carries native copper, cuprite and malachite, with some calcite; and the ore body is said to be 4 feet wide, strike northwest, dip 45° SW. The country rocks are serpentine and some basalt. There are two shafts (an incline and a vertical) and one adit. The depth of the old workings is not known. On the failure of their smelter built in the valley below, the original operators shipped hand-picked ore for a time to Selby's smelter. Only assessment work has been done of recent years.

Bibl.: R. IV, p. 125; V, p. 97; VI, Pt. I, p. 104; X, pp. 158, 261; Bull. 50, p. 160.

Ruby King Group (see under Mineral Paint.)

GOLD AND SILVER.

Clyde Mine. Geo. and Thomas Moyer, owners. It is in the SE. ¼ Sec. 12, T. 14 N., R. 6 W., 3 miles northwest of Sulphur Creek post office. For several years between 1880 and 1890, it contributed to the county's gold output; but only assessment work is maintained now. The gold, with small values in silver, occurs in a shale, there being no defined ledge.

Bibl.: R. XI, p. 183; XIII, p. 126.

Keely Claim. This claim, near the Clyde mine, and from which a small production at one time resulted, has been abandoned for several years.

Bibl.: R. XI, p. 184; XIII, p. 126.

Manzanita Mine. (See under Quicksilver.)

Ruby King Paint Mine. (See under Mineral Paint.)

Trout Creek Prospect. Barnett & Drew, locators. It is on the east side of Snow Mountain, northwest of Fouts Springs. A tunnel was driven in 1907, but no work has been done recently.

GYPSUM.

Gypsum has been noted at several points but not developed commercially.

Bibl.: Bull. 38, p. 283.

IODINE (see under Salt).

LIMESTONE.

Lambert Ranch. J. T. Rathbun, College City, in Sec. 20, T. 16 N., R. 5 W., north of Leesville. Lime has been burned from a deposit on this ranch but not recently.

Bibl.: Bull. 38, p. 66.

Manzanita Mine (see also under Quicksilver). Jones & Ryan, Sulphur Creek, owners. There is a belt of crystalline limestone on the western part of this property, which has been utilized locally. Idle.

Bibl.: Bull. 27, p. 45; Bull. 38, p. 66.

Wide Awake Mine (see also under Quicksilver). A. A. Gibson, Sulphur Creek, owner. There is a body of limestone composed entirely of fossil shells, on the Wide Awake quicksilver property. It has been utilized locally.

Bibl.: R. VIII, p. 188; Bull. 3, p. 6; U. S. G. S., Mon. XIII, p. 367.

MANGANESE.

Small amounts of manganese in jasper have been prospected on the eastern slope of St. John's Mountain west of Stonyford, but nothing of consequence developed.

Bibl.: U. S. G. S., Bull. 427, p. 164.

MINERAL PAINT.

Ruby King Mineral Paint Company (formerly the Ruby King Copper Mining and Townsite Improvement Company). Dr. A. M. McCullom, president; A. C. Kaufman, secretary; office, 1027 Eighth street, Sacramento. It is in Secs. 29 and 32, T. 17 N., R. 6 W., 4 miles south of west from Lodoga, elevation 1350 feet (bar.). The ground controlled includes forty acres under an agricultural patent and six unpatented mining claims. South of these the company also has a group of copper claims located in 1861 and from which some ore was shipped to the smelter. The present company relocated in 1898. The formation is an oxidized, ferro-magnesian igneous rock, so altered that the original rock could not be exactly identified. In this occur masses (see photo No. 102) of hematite and limonite (the latter in smaller quantity), both

Photo No. 102. Outcrop of "paint rock" at Ruby King Mineral Paint Mine, Colusa County, California.

of which are more or less silicified. It outcrops irregularly and is irregularly colored. The material is said to carry up to $2 per ton in gold, and also small values in quicksilver. There are also occasional small green-colored patches due to associated epidote. It is mined by open cut.

In the mill there are two gasoline engines (25 h.p. and 4 h.p.); a 10″ x 12″ jaw crusher, and a Beer roller mill. The rock is crushed dry in the roller mill, through an 8-mesh screen in the front segment. The discharge drops in front of a blower. The fines are blown out along a "tube" (a wooden frame covered with cloth, about 3′ square by 20′ long), with cone hoppers set at intervals in the bottom. The coarser portions from the nearer cones are returned to the mill. At the time it was visited no commercial production had been made, as they were still experimenting with the equipment. The plant is intended to handle fifty tons per day. Practical tests made with experimental lots of this paint are stated to have been very satisfactory. In fact, the buildings at the mine which had been painted with it about a year before, still looked as fresh as if newly coated.

Bibl.: Bull. 50, p. 160; U. S. G. S. Min. Res. 1910, Pt. I, p. 697; 1911, Pt. I, p. 901; 1912, Pt. I, p. 939.

Woods & Harlan Prospect. F. C. Woods, Leesville, and H. H. Harlan, Williams, owners. It is in Sec. 35, T. 18 N., R. 7 W., 4½ miles west from Stonyford, on the south fork of Stony Creek; elevation 1300 feet (bar.). There are masses of both jasper and a highly siliceous yellow ochre outcropping along the creek. There are two principal outcrops of the yellow, showing 10 to 15 feet wide. It is undeveloped.

MINERAL WATER.

The mineral springs of Colusa County are all west of the line of contact between the sedimentary and the metamorphic series, thus bringing them within the area of the latter. Most of them are saline, some of them markedly so, particularly certain springs on Sulphur Creek.

Blank's Sulphur Spring. A. A. Gibson, Sulphur Creek, owner. This spring is now included in the Wide Awake quicksilver mining property. It is on the south side of Sulphur Creek, a short distance west of the post office. When the Wide Awake shaft (down 500 feet), which is a few hundred feet distant, was sunk it cut off this spring. As long as the shaft was kept open the spring was dry. Now that the shaft is filled with water to within 56 feet of the collar, the spring is again flowing, but its temperature is 104° F. instead of 108° F. as formerly. It is not utilized except locally.

Bibl.: R. XIII, p. 509; U. S. G. S. Bull. 32, p. 203; Water Sup. Pap. 338, p. 104; WINSLOW ANDERSON, "Mineral Springs and Health Resorts of California," p. 97.

Cooks Mineral Springs. Cooks Springs Mineral Water Company, owner; U. W. Brown, president; I. G. Zumwalt, secretary; A. A. Entrican, treasurer and superintendent; home office, Williams; H. S. Green, manager at the springs; post office address, Leesville. The springs are in Sec. 9, T. 16 N., R. 6 W., 10 miles northwest from Leesville and 32 miles from Williams. An automobile stage connects with the railroad at Williams during the summer season. The springs are in a canyon on a branch of Indian Creek, at an elevation of 1550 feet (barometric reading), and were first taken up by John Cooks about 1870. The present company was incorporated in 1899. The temperatures are: "Cooks" 63° F., "Iron" 55°, "Dead Shot" 61° to 65°. The first named is the principal spring and the one from which the water is bottled for sale. The "Dead Shot," in metamorphic sandstone, is a series of springs covering an area of about 20 feet square, on the side of and in the bed of the creek. It is $\frac{3}{4}$ of a mile up the canyon from the hotel and about 200 feet higher. Water is piped from it to the bathhouse. The other two are in serpentine. There are accommodations for 150 in the hotel and 175 in the thirty-five cottages.

Previous to 1900 water was bottled only for local sale in the county, amounting to a few cases monthly. At present the bottling works have a capacity of 10,000 bottles (5 per gallon) per day, requiring a crew of eleven men and a foreman. The plant is operated only from May to October. Steam power is used, burning wood, and with a 6 h.p. upright engine. The other equipment includes a mechanical bottle washer, crowning machine and a mechanical labeler. A block tin pipe over 300 feet in length conveys the water from the spring to the works which are seven feet lower in elevation. A pump forces the water through a cloth filter to take out any precipitated iron. It is not carbonated artificially but bottled with only its naturally contained gas. Two 10-mule teams were hauling the product to Williams.

Bibl.: R. VIII, p. 159; XIII, p. 509; U. S. G. S. Bull 32, p. 204; Water Sup. Pap. 338, p. 204; ANDERSON (op. cit.) p. 120.

At Fenders Ranch, about a mile west of Lodoga, the well which is used for domestic purposes yields a mild sulphuretted water from a depth of 65 feet.

Elgin Mine (see also under Quicksilver). New Elgin Quicksilver Mining Company; owner, W. S. Norman, Spokane, Wash. The Elgin is at the head of Sulphur Creek, about 3 miles northwest of the post office of the same name. From the "lower" tunnel, which is 500 feet above the bottom of the canyon, a stream of hot salino-sulphur water flows over 40,000 gallons per twenty-four hours. Its temperature is 138° F., and the odors of both sulphuretted hydrogen and ammonia are noticeable. It is strongly saline and is said to carry about 2000 grains of mineral matter per gallon. There is a considerable deposit of flour sulphur along the edges of the stream (see photo No. 105). Higher up near the top of the ridge there is another similar spring, temperature 152° F., which also has a strong flow. A peculiar feature of these hot springs is the presence in considerable numbers of a small fly around the edges of the streams and pools, even occasionally alighting on the surface of the hot water.

Photo No. 105. Hot salino-sulphur water flowing from tunnel of Elgin Quicksilver Mine at head of Sulphur Creek, Colusa County, California.

Though the property, as far as quicksilver mining is concerned, has been idle for some years, this water is utilized occasionally locally.

Some rather unusual curative effects ascribed to it (and also to the similar waters of both Jones and Wilbur springs) by reliable witnesses, it would seem to the writer, can only be explained by the possession of radioactivity. As suggested in the introduction to Mineral Water under Lake County, it is hoped that some day before long these and other similar waters in California will be properly tested for radioactivity.

Bibl.: SCIENCE, Vol. 23, 1894, pp. 120–121; U. S. G. S., Water Sup. Pap. 338, pp. 104–106.

Fouts Springs. C. H. Glenn, Willows, owner. These springs are in Sec. 5, T. 17 N., R. 7 W., 10 miles south of west from Stonyford, and about 35 miles from Willows, with which they are connected by automobile stage during the summer season. They are within the lines of the California National Forest, the ground (1350 acres) being held under an agricultural patent. They were located by John Fouts some time between 1850 and 1860. The springs are on Mill Creek and the South Fork of Stony Creek, in the edge of the hills surrounding a picturesque mountain valley at the foot of Snow Mountain. The elevation is 1800 feet (bar.) at the hotel. There are accommodations for 150 in the hotel and cottages. There are three principal springs, all in serpentine, and their temperatures are: "Champagne" (soda and iron) 67° F., "Red Eye" 76°, "Bath Spring" or "Red Eye No. 2" 76°. These latter two are salino-chalybeate, and are called "Red Eye" because of a bright red deposit of iron which has formed around the orifice. There is also a noticeable deposition of salt around these springs. They both have strong flows and show much excess carbonic acid gas.

Bottling the water for sale began in January, 1913, the plant being located at the Red Eye Spring about ½ of a mile north of the hotel. Water from this spring is bottled direct, not carbonated; while that from the Champagne Spring at the hotel is hauled in a tank wagon to the works and charged artificially. Steam power is used, burning wood. Equipment includes bottle washer, filling and crowning machines, automatic labeler, and a belt conveyor from labeler to packing table. Water from the Bath Spring is run in a small flume about 500 feet down the creek to the bathhouse near the bottling works. There is considerable jaspery quartz float on the north side of the creek (South Fork of Stony) opposite the works. This has been prospected for gold by a short tunnel at one point.

Bibl.: R. XIII, p. 509; U. S. G. S., Water Sup. Pap. 338, pp. 205–207.

Jones Hot Sulphur Springs. Tilden Jones and Mrs. J. A. Ryan, owners; post office, Sulphur Creek. The springs are in the canyon of Sulphur Creek, a mile above Wilbur Springs, 21 miles northeast of

Lower Lake and 26 miles southwest from Williams, with which it is connected by automobile stage. The resort is open throughout the year. Elevation 1475 feet (bar.).

There are several springs, both hot and cold, and two drilled wells, called "The Geyser" and "Nottingham Spring." The former (see photo 104A) is intermittent, spouting every twenty to thirty minutes. It is 196 feet deep and has a 3-inch casing in the upper part down through the softer surface material, the balance being in rock. A temperature of 156° F. was obtained. It is probably actually higher than that, as it was difficult to hold the thermometer in the stream while spouting. The odor of both ammonia and sulphuretted hydrogen are noticeable, probably being in the form of ammonia sulphide with an excess of H_2S. The vapor coming off just ahead of the water is inflam-

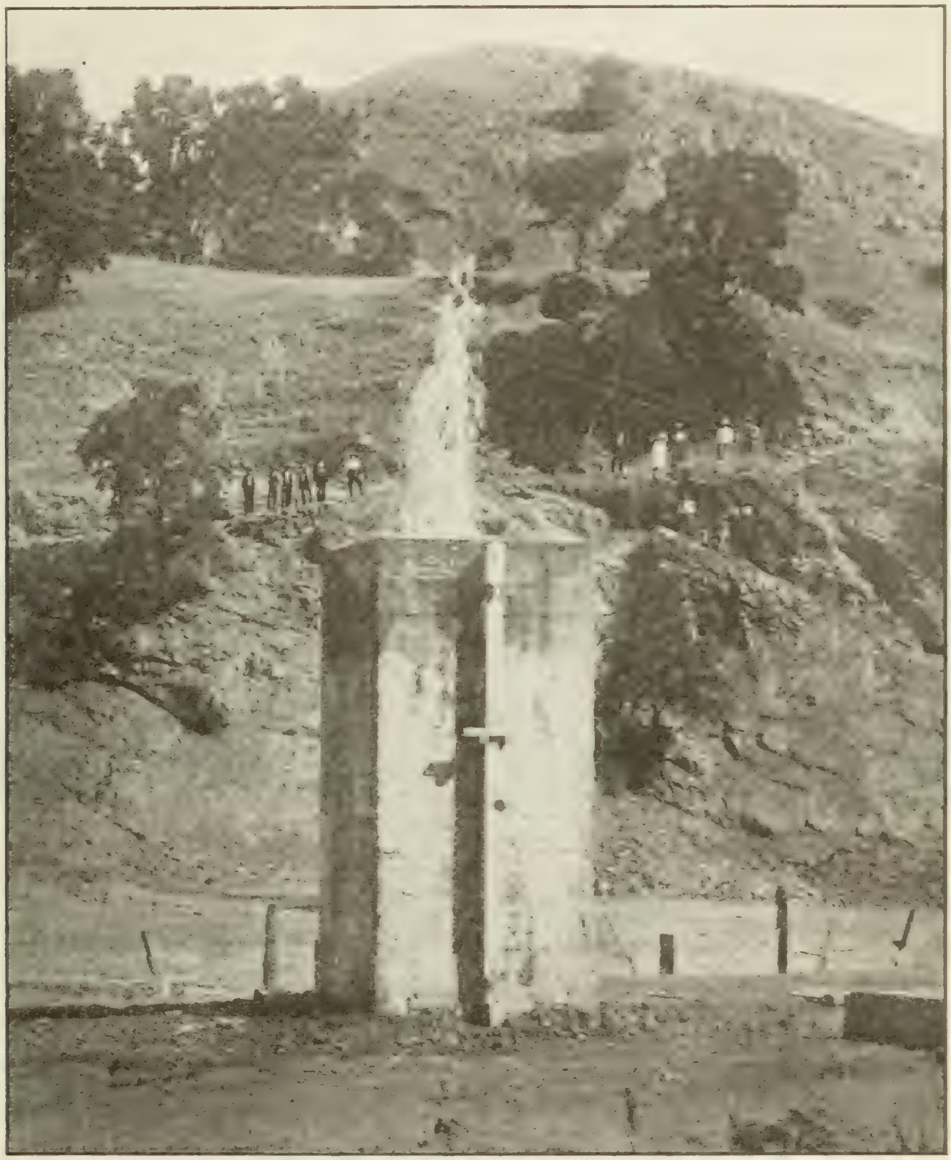


Photo No. 104A. "Geyser" at Jones' Hot Sulphur Springs, Colusa County, California. A drilled well—spouts every twenty to thirty minutes.

mable. This may be due to the presence of finely divided sublimed sulphur, as there is an abundant deposit of flour sulphur about the vent. The water is caught by the concrete curb and piped to the bathhouse. The "Nottingham," temperature 177° F., flows a small pulsating stream, and has similar characteristics to the Geyser.

The other springs have the following temperatures: Mud Bath (black sulphur, in bed of creek) 108° F., Pink 97°, White 110°, Corn (white sulphur) 96°, Cold Black Sulphur 68°, Epsom Well 62°. The springs are associated with serpentine and with mineral veins. The Manzanita mining property (see under Quicksilver) is now owned in conjunction with the springs, which it adjoins on the north side of the canyon opposite the hotel. The Geyser was drilled in 1904, and the hotel built in 1906. No water is bottled from these springs, being used principally for bathing.

Photo No. 104. Wilbur Hot Springs, Colusa County, California.

Bibl.: U. S. G. S., Water Sup. Pap. 338, pp. 103, 104.

Salt Springs (see under Salt).

Wilbur Hot Sulphur Springs (previous to 1875 known as Simmons Springs). J. W. Cuthbert, Wilbur Springs, and F. K. Lippitt, Petaluma, owners, operating under name of Wilbur Springs Company. The springs are on Sulphur Creek, in Sec. 28, T. 14 N., R. 5 W., 25 miles southwest from Williams, with which they are connected by auto stage. The elevation is 1400 feet (bar.). These springs were utilized previous to 1860 by the Indians, but the present resort was built in 1908 and since enlarged. The ground, about 1700 acres, held under both agricultural and mining patents, includes also the Farris or Oriental quicksilver mine area. The springs, of which there are twelve principal ones in actual use, are found both in the creek bed and along the banks above. The formations include serpentine, also metamorphic sandstone and igneous rocks in process of serpentinization.

The temperatures of the main springs are as follows: Mud Baths, men's 128° F., women's 120° F.; Iron and Magnesia No. 26, 60°; No. 10 Hot Black Sulphur, 113°; No. 14 Rainbow, 80°; No. 20 Catarrh and Complexion, 116°; No. 22 Hot Sulphur, 131°; No. 24 Cold Magnesia, 60°; No. 34 Jackson, 72°; No. 28 Cold White Sulphur, 62°; No. 30 Cold Black Sulphur, 68°. The hot springs are strongly saline and sulphurous and also contain an appreciable amount of borax, so that it has a slightly soapy feel. Ammonia is also present. None of the water is bottled for sale. There are acommodations for 175 in the hotel and cottages, the resort being kept open throughout the year.

Bibl.: R. III, p. 16; VI, Pt. I, p. 59; VIII, p. 159; X, pp. 155-160; XII, p. 331; XIII, p. 509; U. S. G. S. Bull. 32, pp. 207, 209; Water Sup. Pap. 338, pp. 99–103, 105; GEOL. SURV. OF CAL., GEOL., Vol. I, p. 92; ANDERSON (op. cit.), pp. 244, 265.

In addition to the above there are a number of unutilized springs on the edge of Bear Creek, near its junction with Sulphur Creek (one called "Oil Spring"), and all along the latter from its mouth to the Elgin mine, but principally west of the contact between the sedimentary series and the metamorphics.

Deadshot Springs are on the Stovall & Wilcox ranch in Bear Valley, 5 miles southwest of Leesville.

On the Lovelady ranch, a mile east of the Ruby King mineral paint mine, there are two white sulphur springs in shale and sandstone. Also, about a half mile west of the same mine, there is a saline spring known locally as the "Deer Lick."

In the *McGilvray* sandstone quarry near Sites there is a small sulphur water spring at the lower edge of the quarry. Temperature 75° F.

Bibl.: U. S. G. S., Water Sup. Pap. 338, pp. 194, 195.

NATURAL GAS.

Natural gas in small quantities has been obtained along the western edge of the Sacramento Valley in Colusa County and in the foothills west of Arbuckle and Williams. On the Stovall ranch about 8 miles west of Williams, in 1885, gas was obtained in a well at 150 feet depth.

The water accompanying it was saline. Nearer the foothills and just below Mountain House (Venado post office) a 6-inch well drilled about 1865 yielded brine and an inflammable gas. Natural gas from a vent at the Elgin quicksilver mine at Sulphur Creek was utilized at one time by the company operating the mine. It also occurs at Wilbur Springs.

Bibl.: R. X., p. 156; Bull. 3, pp. 5-7; Bull. 19, pp. 159-161.

ONYX MARBLE.

There is a small deposit of beautifully banded, dark brown "onyx marble" or aragonite near Sulphur Creek. Specimens from this occurrence may be seen in the museum of the State Mining Bureau, and also in the National Museum in Washington, D. C.

Bibl.: R. VIII, p. 159; X, p. 156; Bull. 37, p. 111; Bull. 38, p. 369; U. S. G. S. Water Sup. Pap. 338, p. 106.

PETROLEUM.

There are some small oil seepages along the foothills west of Williams and also near the junction of Sulphur Creek with Bear Creek. From 1900 to 1910 drilling operations were prosecuted intermittently by several companies but nothing of consequence developed. The most prominent of these seepages is in Sec. 21, T. 14 N., R. 5 W., on land owned by A. A. Gibson, of Sulphur Creek. It is locally known as the "Gibson Gusher" and was made the basis for the operations of the Gibson Oil Company.

The Williams Oil Company operated at intervals from 1905 to 1910, drilling five wells at and near Mountain House (Venado post office). Their first well was sunk to 2560 feet. In their second well it is stated that at 55 feet a small seepage was struck, and at 690 feet three feet of sand with oil, also gas, which latter was used at the boiler. At that point the tools were lost. The third well went to nearly 2000 feet. The fifth well was stopped at about 1500 feet. This derrick is still standing and the well yields saline water and an inflammable gas. Neither are utilized. The following companies also operated in the district: Herron Oil Company, Corwin Oil Company, Gorrill & Smith Oil Company, Bear Valley Oil and Development Company, Chehalis Oil and Mining Company.

Bibl.: R. IV, pp. 295, 296; X, p. 164; XIII, p. 570; Bull. 3, p. 6; Bull. 19, pp. 159–161, 205; Bull. 69, p. 441; U. S. G. S., Water Sup. Pap. 338, p. 194.

QUICKSILVER.

Abbott Mine (see under Lake County).

Buckeye Mine (see Wide Awake Consolidated).

Central Mine (part of Manzanita).

Elgin Mine. New Elgin Quicksilver Mining Company, W. S. Norman, Spokane, Wash., owner. This mine is at the head of Sulphur Creek, in Sec. 13, T. 14 N., R. 6 W., about 3 miles northwest from Sulphur Creek post office. The last operations on this mine resulting in a production of quicksilver, were in 1908 and 1909, since which time it has been idle as it was for some years previous. One important difficulty in working this mine has been the hot sulphur water present (see under Mineral Water). This could probably be obviated by driving a drainage tunnel from the creek level, as the present ''lower'' tunnel is 500 feet above the retorts. The ledge matter is a black to white opaline rock (the black resembling obsidian) with cinnabar and an abundance of native sulphur crystals. In fact, so highly impregnated are the rocks here with sulphur (resembling the famous Sulphur Bank mine in Lake County) that in the early history of the property attempts were made to produce sulphur commercially by distillation. The mine is equipped with a retort furnace, and when last operated used a Griffin mill and Colorado bumping tables for concentrating the cinnabar.

> Bibl.: R. VI, Pt. I, p. 136; XI, p. 182; XII, p. 359; XIII, p. 594; Bull. 27, p. 43; U. S. G. S. Min. Res. 1907, Pt. I, p. 679; 1908, Pt. I, p. 685; 1909, Pt. I, p. 552; MIN. RES. W. OF ROCKY MTS., 1875, p. 14; 1876, p. 20.

Empire Group. Empire Consolidated Quicksilver Mining Company, Jas. H. Boyer et al., 1106 Merchants National Bank Building, San Francisco, owners. This property, in Sec. 28, T. 14 N., R. 5 W., near Sulphur Creek, is owned and was at one time operated in conjunction with the Abbott mine, which is principally on the Lake County side of the boundary line. It has been idle several years.

> Bibl.: R. XI, p. 186; XIII, p. 594; Bull. 27, p. 43.

Farris or Oriental (see Wilbur Springs under Mineral Water).

Manzanita Mine. Tilden Jones, Sulphur Creek, and Mrs. J. A. Ryan, owners. This mine, now owned as a part of the Jones Hot Springs property, is on Sulphur Creek, in Sec. 29, T. 14 N., R. 5 W., 26 miles southwest from Williams. By reason of the Manzanita's ore carrying an important percentage of gold as well as cinnabar, in its earlier history the mine was worked for its gold content. While gold has been found at other places associated with mercury in small quantities (usually little more than a trace) the Manzanita mine is the one notable quicksilver mine of the world where there has been a sufficient percentage of gold to work the ore at times for that metal alone. Bituminous matter and native sulphur are also found here.

The first recorded mention of this gold occurrence was 1865 (Geological Survey of California, Geology, Vol. I, p. 92), and the deposit was worked principally for gold up to 1891. The major portion of Colusa County's gold output to date (see Table, page 4) came from the Manzanita. The total quicksilver production of the mine approximates 2000 flasks, the most of which was obtained by means of concentration during the eight years up to 1912. The ore was broken in a No. 1 Gates breaker to pass a 1-inch screen, then through a 5-foot Huntington mill with 20-mesh screen. Six Gilpin County, Colorado, bumping tables were used (since moved to the Ætna mine, Napa County), the tailings from which passed to cone separators. The underflow from the cones was passed to another concentrator. G. V. Northey, owner and operator during this period, states (Engineering and Mining Journal, Vol. 96, p. 783) that the mill treated from two to five tons per hour, the concentrates averaging 35% to 40% quicksilver (often as high as 68%), "while the tailings for several months' milling averaged from 5 to 10 cents per ton."

The dried concentrates, mixed with 10% to 25% lime, were retorted. Power required for the plant was 25 h.p., derived from a distillate engine. The concentrators were driven by a separate engine. The cost of milling is stated (loc. cit.) to have been 60 cents per ton of ore treated. "Under some favorable conditions the cost of milling was reduced as low as 25 cents per ton. This low cost applied to ore that occurred in the form of sand, the common name in the camp being 'brown sugar.' The average value of the ore was about $5 per ton, or about 0.5% quicksilver."

Bibl.: R. V., p. 96; VI, Pt. I, p. 33; VIII, pp. 157, 159; X, pp. 159, 161; XI, p. 184; XII, pp. 100, 359; XIII, pp. 126, 594; Bull. 27, pp. 44, 198, 202; GEOL. SURV. OF CAL., Geol., Vol. I, p. 92; U. S. G. S. Mon. XIII, p. 367; Min. Res. 1892, p. 147; 1902, p. 252; 1907, Pt. I, p. 679; 1908, Pt. I, p. 685; 1909, Pt. I, p. 552; 1911, Pt. I, p. 901; Eng. & Min. Jour., Vol. 96, p. 783.

Oriental (see Farris).

Rathbun Prospect (abandoned).

Bibl.: R. XI, p. 181; XII, p. 359; XIII, p. 594.

Wide Awake Consolidated (Buckeye). This mine, originally known as the Buckeye, is owned by A. A. Gibson, Sulphur Creek. It is a short distance from the post office and south of the creek, in Sec. 29, T. 14 N.,

R. 5 W., 26 miles southwest from Williams. It is on the opposite (east) side of the ridge from the Abbott mine. The property has been idle since 1901, and the shaft (500 feet deep) is now filled with water.

This mine first appeared in the producing list in 1875. After having been closed for a number of years, it was reopened in 1896 and yielded a small output for a time. The ore, carrying cinnabar, was found at and near the contact between serpentine and shale, strike northwest, dip southwest about 60°. It is stated that this contact has been traced for about a mile in the company's ground, though the croppings are more prominent near the plant. It was worked by both tunnels and shaft, the latter being sunk in the shale. The vein matter was found up to five feet wide, mostly soft, with the shale hanging-wall well defined, while the values were slightly disseminated into the serpentine footwall. The reduction equipment includes a 24-ton Scott fine-ore furnace.

Bibl.: R. XI, p. 187; R. XIII, p. 594; Bull. 27, p. 45; Geol. Surv. of Cal., Geol. Vol. II, p. 124; Min. Res. W. of Rocky Mts., 1875, p. 14; 1876, p. 20; U. S. G. S. Mon. XIII, p. 368; Min. Res. 1908, Pt. I, p. 685.

SALT.

For a number of years salt was manufactured by solar evaporation of brine from a series of springs on the Peterson ranch in Antelope Valley, near Sites. The Antelope Crystal Salt Company was the operator. No production has been reported for the past five years. An interesting occurrence was the presence of an appreciable percentage of iodine in the brine of one of these springs.

Bibl.: R. X, p. 164; XI, p. 180; Bull. 24, pp. 107, 114; U. S. G. S., Water Sup. Pap. 338, p. 298.

SANDSTONE.

The well-known Colusa sandstone is obtained from a series of massive beds just east of Sites and extending 8 miles north and south with a width of over ½ mile. Sites is the terminus of the Colusa and Lake Railroad, narrow gauge, which connects with the Southern Pacific main line at Colusa Junction. There the stone has to be transshipped to the standard gauge cars. Principally for this reason, the stone is not dressed at the quarries but at the yards in San Francisco.

These strata extend both north and south of this section for a total length of about 20 miles, but outside of the 8-mile portion near Sites they are not so massive. Their general strike is N. 20° W., with a dip of 40° to 45° E. There are two quarries which are operated commercially, the Colusa and the McGilvray. They adjoin, the first named being the older, and to the north (see photo No. 92). Both properties have railroad facilities. The canyon of Stone Corral Creek cuts through the series nearly east and west at about the center of the Colusa company's ground. The individual strata vary in thickness up to 18 feet so far as opened up by quarrying operations.

The stone is very even-grained and is quite uniform in color, being a blue-gray which darkens but slightly in weathering. It is exceptionally well adapted for general use as a building material. Among other tests made on this stone the following by Thomas Price & Son, analytical chemists, is of interest (State Mining Bureau, Bull. 38, p. 124): "When heated to a red heat and plunged into water, the stone neither splinters nor cracks. It resists, without fusion, the temperature of a full white heat, not even the sharp edges of the stone being blunted. Plunged into water after being subjected to a full white heat, the stone assumes a light brown color." Colusa sandstone has been employed so far principally in San Francisco and other central California cities. Some has also been shipped to Hawaii.

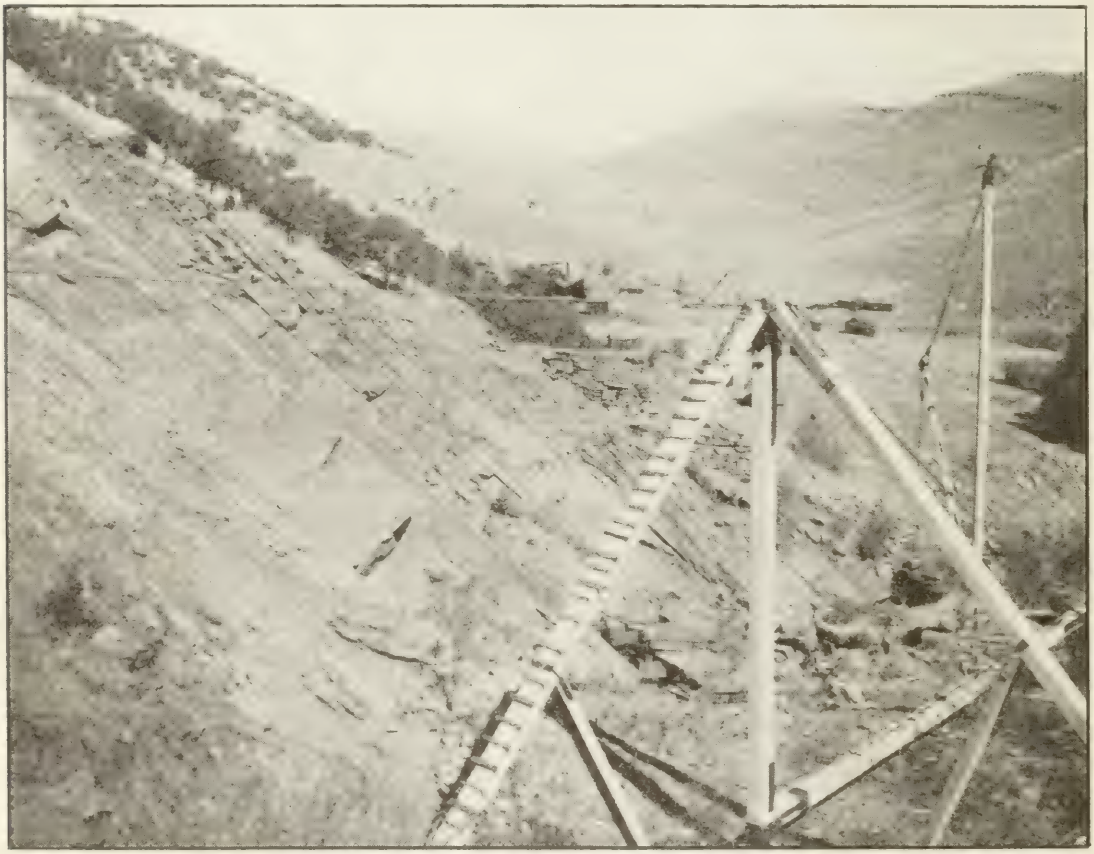


Photo No. 92. Sandstone beds in McGilvray quarry, Colusa County, California, looking north. Bed in center 15 feet thick. Colusa sandstone quarry in middle distance.

Colusa Sandstone Company (O'Neil & Abbott; also Sites Sandstone Company). F. E. Knowles, president; Abel Hosmer, secretary; home office and yards, Tenth and Division streets, San Francisco. This quarry in the S. $\frac{1}{2}$ of SE. $\frac{1}{4}$ of Sec. 20, T. 17 N., R. 4 W., $\frac{3}{4}$ mile east of Sites, was first opened up in 1891 by O'Neil & Abbott, and later worked by the Sites Sandstone Company. Elevation 200 feet (bar.). The Ferry Building in San Francisco, 1896, was the first large building constructed of this stone. The most recent is the new fourth wing of the St. Francis Hotel, 1913 (see photo No. 175), the other three wings being from the McGilvray quarry. In the quarry (see photo No. 98), a channeler and machine drills are used, and the blocks are split off both by wedging and by blasting. The equipment includes two derricks and a steam hoist. Formerly there was a well equipped plant of saws and other stone dressing machinery, but this work is now all done at the yard in San Francisco. The change was made to obviate the losses from spalling and breakage attendant on transshipping the stone at Colusa Junction.

Photo No. 175. St. Francis Hotel, San Francisco (December, 1913). Colusa sandstone.

This sandstone can be obtained in any desirable dimensions. There are four monolithic columns in the Bank Building at Santa Cruz from the Colusa Company, the pieces as shipped from the quarry being 22′ 6″ long, by 4′ 10″ square at the bottom and 3′ 6″ square at the top. Four others of the same size were shipped to the yard at the same time. In addition to those already mentioned above, stone for the following prominent buildings in San Francisco was furnished by the Colusa Company: Butler (corner Geary and Stockton streets); French-American Bank; Monadnock (ten stories); Metropolis (now Merchants) National Bank; Aronson (corner Third and Mission streets); and the

Gunst on the opposite corner; Kamm, above the Call Building; three Home Telephone buildings and the Spreckels band stand in Golden Gate Park. Also the Thomas Clunie building in Sacramento; Garden City Bank, San Jose; First National Bank, Monterey.

Bibl.: R. XI, p. 188; XII, p. 398; XIII, p. 635; Bull. 38, pp. 119-124.

McGilvray Stone Company. John D. McGilvray, president; John D. McGilvray, Jr., manager. Home office, 634 Townsend street, San Francisco. The McGilvray quarry is in Sec. 29, T. 17 N., R. 4 W., 1 mile southeast from Sites, and adjoins the Colusa property on the south. Elevation 165 feet (bar.). It was opened up by the present owners in 1900, having previously been a part of the Burgett ranch. There is a good face of stone exposed here, over 200 feet along the strike by about the same amount on the dip (see photos Nos. 92 and 93), though they have not the advantage of an open end exposure across the strata to work from, as there is where the canyon of Stone Corral Creek cuts through the Colusa Company's ground. Of large dimension stone two pieces 19′ x 5′ x 22″ have been shipped from this quarry.

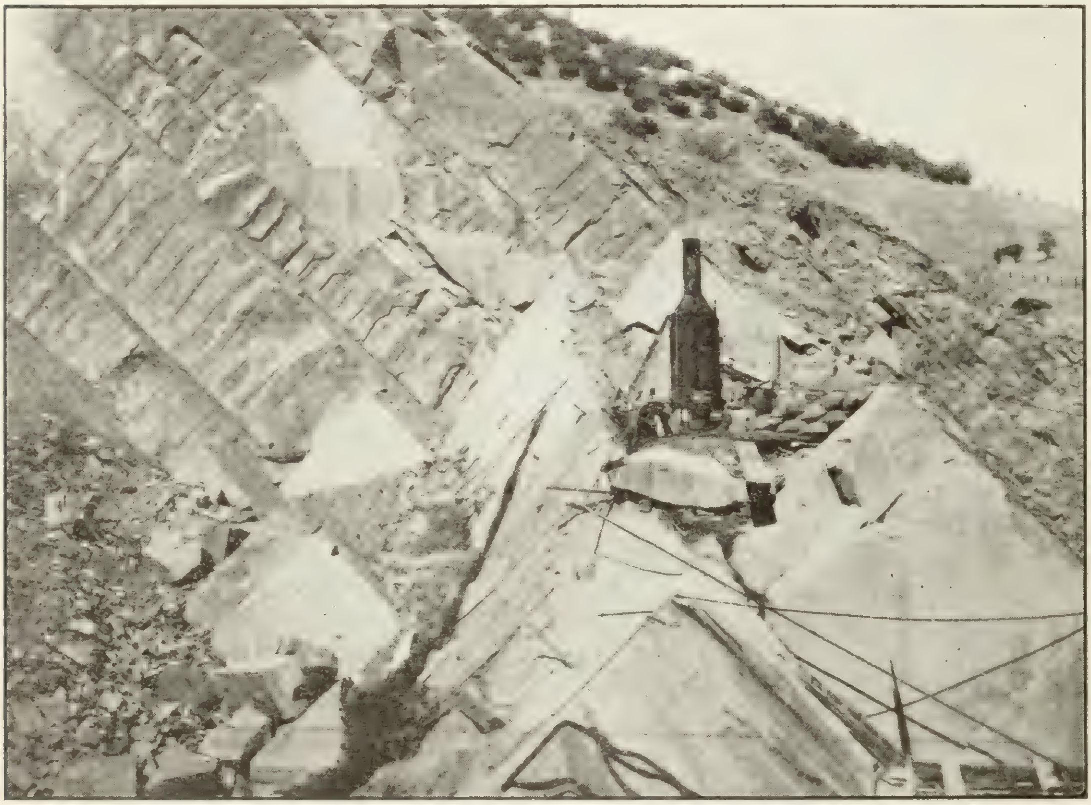


Photo No. 98. In quarry of Colusa Sandstone Company, Colusa County, California.

Among the more prominent buildings in San Francisco constructed of stone from this quarry, besides the St. Francis Hotel already noted, are the Flood Building; Kohl (originally Hayward); Humboldt Savings Bank (seventeen stories); Carroll & Tilton (above Call Building); Mutual Savings Bank; Sherith Israel Synagogue (corner California and Webster streets); Italian-American Bank, and the Shreve Building.

In blocking out the stone machine drills are used, and occasionally the channeler. On the thinner beds wedges are employed, while with the thick ones the drill holes are reamed V-shaped on two sides and sprung with powder. There are three derricks with steam hoists. Utah coal costs $10 to $11 per ton at Sites. Only a small amount of stone was shipped in 1913.

Photo No. 93. Fifteen-foot bed of sandstone, McGilvray quarry, Colusa County, California.

Bibl.: Bull. 38, pp. 119-125.

STONE INDUSTRY.

Both the *Colusa Sandstone Company* and the *McGilvray Stone Company,* near Sites (see under Sandstone), occasionally ship spoil from their sandstone quarries for use as macadam and rubble.

Bibl.: Bull. 38, p. 316.

The *City of Colusa* utilizes sand and gravel from the Sacramento River for street work. It pays 15 cents per cubic yard to the abutting property owners for hauling over their right of way. In an ordinary year the city uses 500 to 700 yards for street repair; but in 1913 considerable more was used on account of new pavement being put down, with a concrete base.

In the eastern part of T. 17 N., R. 3 W., near Maxwell and extending north into Glenn County, is a belt of old river gravel which is utilized occasionally for road work.

SULPHUR.

Sulphur in considerable quantities occurs at both the Elgin and Manzanita quicksilver mines at Sulphur Creek. Attempts were made at one time to produce it commercially, as was done at the Sulphur Bank mine in Lake County (*q. v.*), about 15 miles west of here, but without success.

Bibl.: R. VIII, p. 159; X, pp. 159, 160; XI, p. 187; Bull. 27, p. 43; Bull. 38, p. 354.

GLENN COUNTY.

Field Work in September, 1913.

Glenn County, formerly a part of Colusa, which is on its south, was formed March 11, 1891, and has an area of 1400 square miles. The Sacramento River forms the eastern boundary, separating it from Butte County. Tehama is on the north, with Mendocino and Lake on the west. The drainage is all tributary to the Sacramento, the principal streams being Stony Creek and Willow Creek. Being one of the valley counties, Glenn's resources are largely agricultural. Chrome, brick clay, gravel, and crushed rock are the only mineral substances from which commercial production has resulted so far. Besides these, occurrences have been noted of coal, copper, gold, granite, manganese, quicksilver, marble, sandstone, slate, and soapstone.

Table of Mineral Production.

Year	Amount	Value	Substance
1893 and previous	3,319 long tons	$49,700	Chrome.
1909	140,000 tons	49,000	Macadam.
1910	378,000 tons	34,020	Rubble.
1911	421,775 tons	51,430	Sand and gravel.
1912	543,675 tons	32,950	Sand and gravel.
1913	416,640 tons	27,776	Sand and gravel.
Total value		$244,876	

BRICK CLAY.

Bricks have been made from clay beds near Willows and Orland, but not of recent years.

Bibl.: Bull. 38, p. 243.

COAL.

Some years ago some work was done on several small coal veins on the west side of the valley, by the Glenn County Oil and Coal Company (now defunct), J. A. Apperson et al., of Willows; but nothing of consequence was developed.

COPPER.

Copper indications have been found at several points along the western part of the county and a number of claims located. With one exception these were all abandoned or idle in 1913. Prospecting was being done on a group of four claims located by J. A. Bedford, northwest from Elk Creek post office, in the Grindstone Creek section.

CHROME.

Black Diamond Mine (formerly Whitlock & Oakes). Guy M. Luce, Woodland, owner. It is in Sec. 25, T. 22 N., R. 7 W., 3 miles west of Millsaps. For a few years previous to 1894 this mine was an active producer of chrome ore, but it has not been worked of recent years. There are other deposits of chromite reported in the same range, but nothing has been done with them.

Bibl.: R. XII, p. 36; Bull. 38, p. 268.

GOLD.

Gold has been found near Millsaps and a little work done but nothing of consequence developed.

Bibl.: R. XII, p. 132.

GRANITE.

There is a dike of syenitic granite in sandstone on the Talbott Ranch, in Sec. 8, T. 18 N., R. 4 W., southwest of Willows. Not developed.

Bibl.: Bull. 38, p. 28.

MANGANESE.

North Star Claim. A. W. Sehorn, Willows, owner. In Secs. 14 and 23, T. 18 N., R. 7 W., about 6 miles northwest from Stonyford, Colusa County. It is stated that the manganese vein, 40 feet wide, was struck at 200 feet depth in driving a tunnel on a copper prospect. Values up to 65 per cent manganese, with $2.50 gold and 50 cents silver per ton are reported. Only assessment work is done. No production has been made to date on account of prohibitive transportation, the claim being reached only by trail.

MARBLE.

Alexander Brown, of Oakland, has a deposit of serpentine marble in the northwest corner of T. 18 N., R. 6 W.

H. A. Daniels, of Stonyford, has a deposit of white marble along the east side of Stony Creek in Sec. 21, T. 18 N., R. 6 W.

On the *J. M. Nye ranch* in the southwest corner of the county is said to be a body of onyx marble.

None of these deposits are as yet developed.

MINERAL WATER.

Alder Springs, 40 miles by road north of west from Willows, though not "mineral," have had a local reputation as a summer camping resort for some years.

There are salt springs in Salt Spring Valley, 4 miles north of Stonyford, and others a few miles west of Elk Creek post office. They are at present utilized only as salt licks for cattle.

Bibl.: U. S. G. S., Water Sup. Pap. 338, pp. 299, 359.

NATURAL GAS.

Natural gas has been reported on the Rideout ranch near Norman, in the western part of the county.

Bibl.: Bull. 3, p. 7.

ONYX MARBLE (see Marble).

PETROLEUM.

It is reported that options have been taken on land west of Germantown, with the intention of drilling for oil. Nothing has as yet been developed, nor does it seem likely from the geology that oil in commercial quantities will be found.

QUICKSILVER.

Cinnabar has been reported on the J. M. Nye ranch, southwest of Fruto, and on the Turner ranch west of Elk Creek post office. Not developed.

Bibl.: R. XII, p. 360.

SLATE.

Slate of good roofing quality occurs in the northwestern part of the county, but it is as yet undeveloped.

Bibl.: Bull. 38, p. 152.

SOAPSTONE.

Soapstone occurs in T. 18 N., R. 6 W., but it is not utilized.

Bibl.: Bull. 38, p. 351.

STONE INDUSTRY.

The only mineral product on the active list in Glenn County for the past three years is gravel. Besides the beds of the present creeks, there is an extensive, old gravel deposit running in an irregular line from Wyo southerly through the county, passing to the east of Willows. It extends to near Maxwell in Colusa County. As distinguished from the fresher gravels in the creek beds, this material has more or less clay mixed with it. The clay acts as a binder, and improves the value of the gravel for road material. However, the same feature makes washing necessary when it is used for concrete work.

Besides those noted below there are several small, privately owned pits, which sell gravel at 40 to 75 cents per yard at the pit.

County Pit (known locally as Forney Glen Pit). The county owns 40 acres in Sec. 24, T. 19 N., R. 3 W., 4 miles southeast of Willows, from which gravel is taken for use on the county roads in that vicinity. It also has a pit in Sec. 17, T. 20 N., R. 3 W. The gravel is loaded by Fresno scrapers and hand shoveling. During the past five years Glenn County has been using $20,000 value of gravel from various parts of the county on road repairs. Under a highway bond issue an additional $40,000 per year was spent for gravel for new construction in 1912 and 1913. In September, 1913, a reinforced concrete bridge, 1300 feet long, was being built (contract price $120,000) across Stony Creek at Wyo. California cement was employed and gravel from the creek bed utilized (photo No. 90.)

Photo No. 87. Southern Pacific Company's "Ballast Loader" at Wyo Gravel Pit, Glenn County, California.

Stony Creek Gravel Pit (Wyo Pit). Southern Pacific Railroad Company, Flood Building, San Francisco, owner. It is $1\frac{1}{2}$ miles north of Orland. The company has 163 acres, extending from Wyo Junction down Stony Creek for over a mile. Operations began here sometime previous to 1882, since which time their holdings have been increased to the present area. The gravel is a clean, medium-sized material with no large boulders in it. A spur track connects the pit with the main line. A Bucyrus drag-line excavator (oil-burning) is used (see photo

No. 87); and at the time visited they were hauling out 30 to 40 carloads per day, carrying 30 to 35 cubic yards per car. Five men in the pit and a train crew of five were employed.

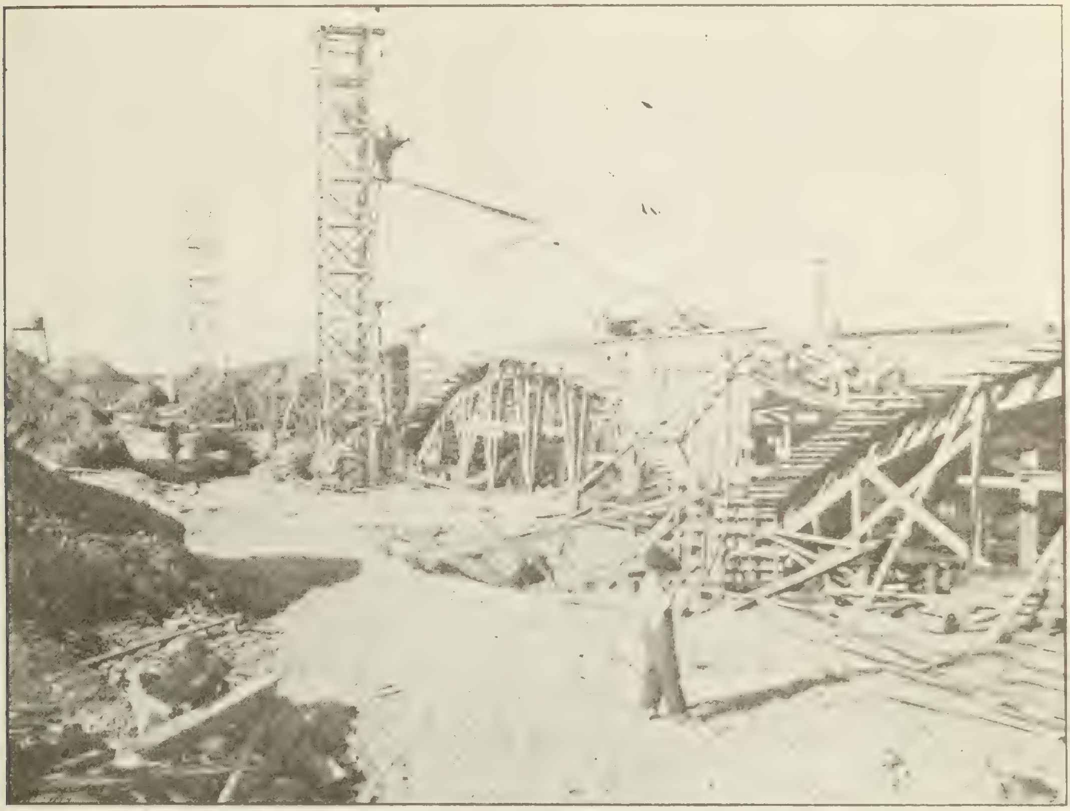


Photo No. 90. Side view of concrete bridge under construction over Stony Creek, near Orland, Glenn County, California, using California cement and creek gravel.

At Grapit siding, 4½ miles south of Orland, the company has 40 acres where the gravel has been taken out to a depth of 16 feet. This gravel has some clay in it. It is now idle as they have worked it out to their lines.

Willows, City Pit. The city of Willows owns 2 acres in Sec. 11, T. 19 N., R. 3 W., 2 miles east of Willows, formerly a part of the Garnet Ranch. In 1912 the city used 71,400 cubic yards at a cost of $1.25 per yard, spread, on street construction. In 1913 something over 7000 cubic yards were used on repair work. This pit is on the line of the older deposit mentioned above.

Wyo Pit (see Stony Creek).

Sandstone which could be utilized commercially occurs in T. 18 N., R. 4 W.; T. 20 N., R. 6 W.; T. 20 N., R. 4 W.; and near Newville. There is also suitable stone reported on the J. M. Nye ranch southwest of Fruto. Not developed.

LAKE COUNTY.

Field Work in August, 1913.

Lake County owes its name to the presence of Clear Lake, which is one of the prominent geographical features of that section of the state. Mendocino and Glenn counties bound it on the north; Glenn, Colusa, and Yolo on the east; Napa on the south; Sonoma and Mendocino on the west. It has an area of 1328 square miles. Of the southern two thirds of the county the drainage is mainly into Clear Lake, except its outlet, Cache Creek, which flows southeastward into the Sacramento River. Putah Creek which also flows to the Sacramento, has its upper branches in the extreme southern part of Lake County. North of the Clear Lake system, the drainage forms the headwaters of the Eel River, which empties into the Pacific Ocean.

Though Lake County has a variety of mineral occurrences and many interesting geological features, but two branches have been exploited or developed to any considerable extent: quicksilver and mineral water. There was also at one time a production of borax and of sulphur, but slight in amount and of short duration.

For a number of years quicksilver was the premier mineral in production for the county, but at the present time it has dropped to an almost insignificant figure, taking second place to mineral water. The greatest activity in quicksilver mining took place between 1875 and 1882, reviving again from 1891 to 1903; though the Abbott was a producer as early as 1870, the Great Western from 1873, and Sulphur Bank in 1874. The Mirabel (formerly Bradford), another important producer, was opened in 1887, but has been abandoned since 1897.

In addition to the above, there are also occurrences of barytes, chromite, copper, kaolin, gold, silver, manganese, natural gas, mineral paint, limestone and "onyx-marble," also some petroleum seepages; none of these, however, are at present utilized commercially.

The following table gives the recorded mineral production of Lake County. The actual production is known to be in excess of these figures, due mainly to: (1) The lack of segregated figures for mineral water previous to 1895. (2) Quicksilver production of some mines previous to 1894 being included with mines of other counties under "various mines." The figures for mineral water represent only that bottled for sale, as it is impossible to even approximate the amount consumed by guests at the resorts. Large amounts also run into the streams, unutilized.

Table of Mineral Production.

Year	Quicksilver		Mineral water	
	Flasks	Value	Gallons	Value
1873	880	$70,790	*	*
1874	1,695	178,280	*	*
1875	8,821	743,287	*	*
1876	14,199	624,756	*	*
1877	18,100	675,130	*	*
1878	14,428	474,681	*	*
1879	15,582	309,303	*	*
1880	17,148	531,588	*	*
1881	17,393	518,833	*	*
1882	10,193	287,748	*	*
1883	6,481	186,329	*	*
1884	4,182	127,551	*	*
1885	4,765	146,524	*	*
1886	3,498	124,179	*	*
1887	4,307	182,509	*	*
1888	6,636	282,030	*	*
1889	4,713	212,085	*	*
1890	4,232	222,180	*	*
1891	4,975	225,119	*	*
1892	11,140	453,509	*	*
1893	9,731	357,614	*	*
1894	12,471	382,954	*	*
1895	12,856	465,074	87,500	$42,000
1896	6,307	232,484	65,920	32,460
1897	3,585	134,546	511,950	76,585
1898	1,729	64,746	523,000	37,350
1899	2,954	128,179	166,020	75,924
1900	3,165	127,345	758,600	45,400
1901	4,395	211,324	201,706	120,360
1902	3,611	161,568	241,100	126,663
1903	2,595	106,397	381,040	187,621
1904	†2,854	109,719	659,000	221,000
1905	1,462	51,937	489,000	219,500
1906	1,066	38,909	365,000	160,000
1907	802	30,604	304,340	130,936
1908	1,300	54,951	246,545	118,300
1909	1,075	56,277	265,000	108,270
1910	1,048	47,422	212,546	95,005
1911	899	41,363	227,440	58,933
1912	209	8,786	202,000	114,500
1913	395	15,891	209,750	109,938
Totals	247,877	$9,404,501	6,117,457	$2,080,745

*Bartlett since 1888 and Witter since 1889 reported to U. S. Geological Survey, but no segregated figures available for Lake County, previous to 1895.

†Flasks of 75 pounds, beginning June 1, 1904. Previously 76½ pounds.

Borax	Sulphur	Pounds	Value
1864 to 1868 Borax Lake yielded 590 tons refined borax, worth $414,636; 1872 from Lake Hachinhama, 140 tons, worth $89,600; total 730 tons, worth $504,236.	1865	214,650	$8,030
	1866	675,963	21,970
	1867	487,603	13,420
	1868	503,481	10,080
	Totals	1,881,697	$53,500

Macadam	Tons	Value	Unapportioned		Value
1908	8,210	$10,000	1900–1909		$28,423

Totals.

Quicksilver	$9,404,501
Mineral water	2,080,745
Borax	504,236
Sulphur	53,500
Macadam	10,000
Unapportioned	28,423
Total to end of 1913	$12,081,405

BARYTES.

There is a specimen of barytes in the Museum of the Bureau, said to have come from near Glenbrook; but the deposit is not developed.

Bibl.: Bull. 38, p. 360.

BORAX.

Borax was at one time produced from Borax Lake, 8 miles west of north from Lower Lake and 2 miles south of the Sulphur Bank mine, having been first described by Dr. John A. Veatch in 1857 (see Report of State Mineralogist III, p. 15). In fact, the first commercial production of borax in the United States was made here in 1864, continuing to 1868, by the California Borax Company (op. cit., pp. 24, 78, 79). There was also some borax produced in 1872 from Little Borax Lake (Lake Hachinhama), 4 miles west of Borax Lake, on the opposite side of Clear Lake. The water of Borax Lake has a decidedly "soapy" feel from the large amount of borax in solution; and during the summer there is a considerable white deposit of the mineral around the shores of the lake (photo No. 21). It is now owned by W. S. Tevis of San Francisco, as a part of the Sulphur Bank property.

Bibl.: Rep. III, pp. 14–26, 78, 79; IV, p. 91; VI, Pt. I, p. 94; VIII, p. 326; X, pp. 237, 243, 269; XII, p. 34; XIII, p. 46; Bull. 24, pp. 51–52; GEOL. SURV. OF CAL., Geology, Vol. I, p. 98; U. S. G. S. MON. XIII, pp. 244, 264–268; MIN. RES. W. OF ROCKY MTNS. 1867, pp. 179-187; 1868, pp. 264-266.

CHROMITE.

There is a large undeveloped deposit of chromite in Sec. 32, T. 19 N., R. 9 W., 3 miles northeast of Hullville; also, it is reported found in considerable quantities along the divide between Lake and Mendocino counties, south and west from Highland Springs; also, in Jerusalem Valley, 8 miles east of Middletown.

Bibl.: Rep. VIII, p. 326; Bulletin 38, p. 362; Reg. of M., Lake County, p. 3.

CLAYS.

Kaolin, said to be of fine quality and in large quantities, is found in the Mt. Sam quicksilver mine on the side of Mt. Konocti, southeast of Kelseyville, in T. 13 N., R. 8 W. The company estimates that this material can be handled at a profit, if they had a railroad to within at least 12 miles of the mine. It is stated that there is a line of these kaolin deposits running southeasterly from the Mt. Sam mine to Thurston Lake; and that after the earthquake of 1906, the creek ran milky white for several days.

There are specimens of clays in the State Mining Bureau Museum from Glenbrook, Kelseyville, Soda Bay, and Sulphur Bank, but none of these deposits have been utilized.

Bibl.: Bull. 38, p. 361; R. IX, p. 303.

COAL.

F. P. Wattenberger claimed to have coal, 3 miles west from Lakeport, and with others had incorporated the Lake County Coal and Developing Company. The property was visited by the field assistant, and the material found to be only laminations of carbonaceus shale in a hard blue sandstone. Samples from the dump and from drillings from a well-boring rig with which the ground was being prospected, were sent to the laboratory for analysis. The field diagnosis was confirmed, with the addition that a trace of lignite was found in one specimen. The drillings showed the same character of material as that found on the dump from the shaft. The shaft was filled with water, so could not be entered.

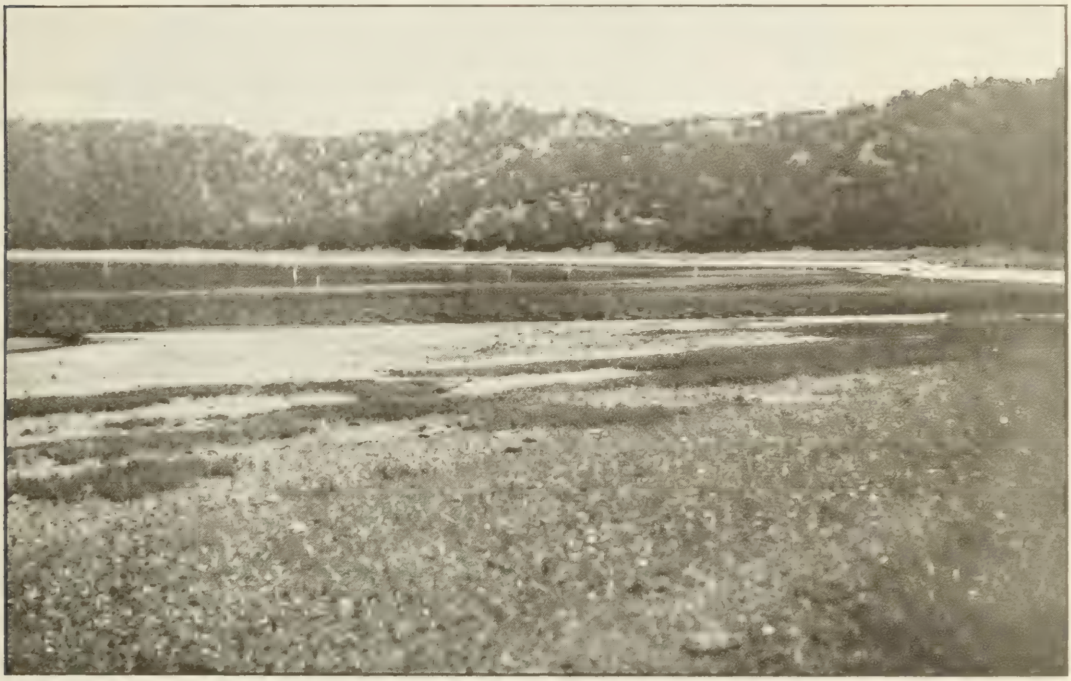


Photo No. 21. Borax Lake from south side.

COPPER.

Christianson Ranch. Copper float has been found on the ranch of Peter Christianson in T. 13 N., R. 7 W., 4 miles northwest from Lower Lake. Some prospecting development work was done in 1879, but no vein found in place. Nothing has been done since.

Copper Prince Mine. H. C. Betts, of Middletown, owner. There are two parallel claims, the Buckeye and the Copper Prince, in Sec. 19, T. 11 N., R. 7 W., 4 miles northwest of Middletown, and above Harbin Springs, at an elevation of about 2000 feet. Only assessment work has been done, annually, so far; being developed mainly by 3 adits, one running in on the vein for 100 feet and reaching a depth of 200 feet below the outcrop. There is also a crosscut of 50 feet from this drift. The ore carries both azurite, malachite and some sulphide, and occurs in limestone. The owner reports having obtained assays up to 25 per cent copper and $6 per ton in gold, but that the formation so far as developed is too much broken up. The lower tunnel is beginning to look more favorable.

Poe Claim. Nothing has been done since 1900 on this prospect, 7 miles west of north from Lakeport.

There are *copper indications* and float reported near Hullville in the northern part of the county, but as yet no locations have been made nor any development work done.

Paul Stuparich has the continuation of the Copper Prince ledge on patented land above Harbin Springs, but no development work has been done.

The Langtry Ranch, 7 miles south of Middletown, Frank Smyth, lessee, is also said to have copper indications.

Bibl.: R. IV, p. 124; Bull. 50, pp. 162-163; Reg. of M. Lake Co., p. 3.

GOLD AND SILVER.

Albert N. Group. Two claims, partly on agricultural patented land of same owner, Albert Nelson, were located in 1911, in Sec. 31, T. 16 N., R. 9 W. The country rock is slate, and the vein formation varies from 5 to 15 feet in width, striking northwest and dipping to the west at about 40°. Development work consists of a 22-foot shaft with 50 feet of drift, and a tunnel of 50 feet. The ore carries pyrite, and assays of $5 to $34 per ton in gold and silver are reported to have been obtained.

LIMESTONE.

There is limestone near the Abbott quicksilver mine, and at Burns Valley north of Lower Lake. At the latter, the Sulphur Bank Mine Company at one time had two kilns, but nothing has been done there for about twenty years past.

Bibl.: R. XII, p. 392; R. XIII, p. 629.

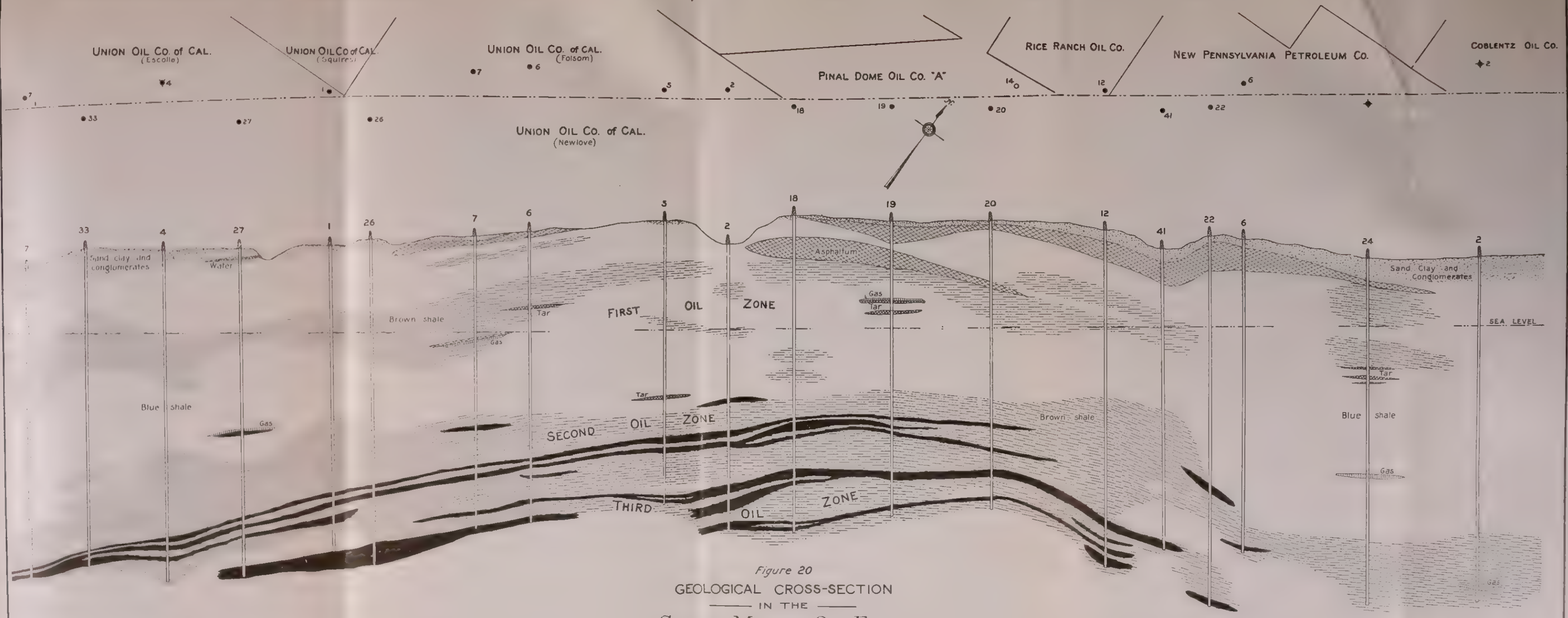


Figure 20

GEOLOGICAL CROSS-SECTION
IN THE
SANTA MARIA OIL FIELD
SANTA BARBARA CO. CAL

Scale

500 0 500 1000 1500
(Feet)

by R E Collom - April 1916

CALIFORNIA STATE MINING BUREAU
Fletcher Hamilton State Mineralogist

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MINERAL PAINT.

Bartels Bros. In Sec. 3, T. 15 N., R. 7 W., 2 miles north of Hough Springs, Bartels Bros., owners of the springs, have located two claims on a deposit of mineral paint. The deposit forms a low spur off one of the higher mountain ridges, and is said to be exposed for a width of 100 feet and 1500 feet in length. There are two colors lying alongside of each other, one being between a burnt umber and burnt sienna in shade, and the other a slightly dark, yellow ochre. The material is pulverulent, requiring little or no grinding, only screening and bolting, to prepare it for use as paint. Only assessment work has been done to date. Pits have been dug in the deposit to a depth of 10 feet, still showing the same character of material as appears at the surface. Samples have been shipped for tests and small amounts have been used for painting around Hough Springs, with favorable results. The deposit is reached by trail from Hough Springs, which is on the main stage road 26 miles west from the railroad at Williams.

Arthur Copsey has a deposit of hematite in Jerusalem Valley, near Dollar Springs, in Sec. 8, T. 11 N., R. 5 W., northeast from Middletown. It is used locally for paint.

MINERAL WATER.

The most prominent item in the mineral industry in Lake County at the present time is her mineral springs. This county has a greater number and variety of mineral springs than any other equal area in the United States, and probably more than all of Europe. Within an area of 1328 square miles (of which about $\frac{1}{15}$ is covered by Clear Lake) it has more than 20 groups of springs which are in active exploitation, including between 100 and 200 individual flows. In addition to those, there are innumerable springs of mineral water, both on private lands and on the public domain, which are not utilized nor exploited in any way. No section of the county is lacking in its quota. We predict that some day this part of California (the same characteristic extending to the adjacent portions of Mendocino, Sonoma, Napa, and Colusa counties) will become one of the greatest health resorts of the world.

Its one great drawback has been and still is: lack of transportation facilities; though automobile stage lines have improved it measurably of recent years. Lake County has not a single mile of railroad within its limits. Given rapid transit facilities, and there will come improved accommodations of hotels, etc., as the demand increases. The principal railroad entrances, now, are: Calistoga on the south; Pieta and Ukiah on the west; and Williams on the east. There are cures here for practically every ill of mankind which is curable by such treatment. There are two main classes of springs: the cold, as Adams, Bartlett and Witter; and the hot, like Seigler and Harbin.

As will be noted by an examination of the analyses, the characteristic constituents of the various springs cover a wide range, even showing marked differences in some closely adjacent waters. Some are suitable only for bathing; some, purely medicinal; while others are excellent table waters; and in each class may be found some the equal of any of the world-famed varieties of Europe; but, the properties, most of them, lack suitable accommodations and traveling facilities. They are not sufficiently advertised, and with two notable exceptions (in Lake County) they are without resident physicians. Practically all of the mineral springs of Lake County are delightful outing places as well as health resorts, and excellent hunting and fishing are to be had in their vicinities.

In 1890 Dr. Winslow Anderson in his valuable book "Mineral Springs and Health Resorts of California," called attention to the lack of system in the use and treatments at American resorts as compared to the European, saying that the European system "is the only thing our California mineral springs need to make them as successful in this treatment of the many chronic diseases as the späs of Europe are." And the same statement still applies to the majority of California resorts, today.

As to medicinal values, a short extract from Bulletin 91, pages 12-16, Bureau of Chemistry, U. S. Dept. of Agriculture, on the "Mineral Waters of the United States," will give a summary of the various classes and their particular values:

> The physiological action and therapeutic applications of the various classes of mineral waters here given do not represent the results of experiments carried on in the bureau of chemistry, but are gathered from works which are considered authoritative on the subject.
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> *Carbonated or bicarbonated alkaline waters.* This is one of the most important groups of mineral waters. They are of value in catarrhal conditions of the mucuous membranes, rheumatism, gout, diabetes, etc.
>
> *Sodic carbonated and bicarbonated alkaline waters.* * * * They have been used with excellent results in treating acid dyspepsia, rheumatism, gout and diabetes. Such waters are also of value in breaking up and eliminating uric acid deposits. * * *
>
> *Potassic carbonated and bicarbonated alkaline waters* have very much the same action as the sodic carbonated, except that they are perhaps better for increasing the solubility and elimination of uric acid. * * *
>
> *Lithic carbonated and bicarbonated alkaline waters.* While lithium seldom or never occurs in waters in large enough quantities to be a predominating basic constituent, still it does often appear in sufficient quantities to have a decided therapeutic action. * * * Waters of this class find their greatest application in the treatment of rheumatism, rheumatic tendencies and gout. In cases of gravel and calculi they are also valuable disintegrating agents.
>
> *Magnesic carbonated and bicarbonated alkaline waters.* Such waters as these act as mild laxatives. * * * and are much used in catarrhal conditions of the mucous membrane of the urinary organs.
>
> *Calcic carbonated and bicarbonated alkaline waters.* * * * This class of waters is quite different in its effect from the carbonated waters previously mentioned. While the foregoing waters are evacuant and promote secretions, this class of waters constipates and decreases the secretions. * * *

Ferruginous bicarbonated alkaline waters. * * * Such waters give excellent results when used as a tonic. They find their principal application in anæmia and in general debility brought about by sexual diseases.

Borated alkaline waters. * * * There are comparatively few springs of this description which have been used to any extent. Their therapeutic application, therefore, is somewhat obscure. It may be said, in general, that such waters act as anti acids. * * *

Muriated alkaline-saline waters. * * * These waters are especially valuable in the treatment of catarrhal conditions of the mucous membrane of the stomach, intestines, and biliary passages, and urinary tract. * * * The stronger ones are often used as a gargle.

Sulphated alkaline-saline waters. These waters, like the preceding class, are valuable in the treatment of catarrhal conditions of the mucous membrane. * * * In large quantities they act as purgatives * * * and are especially indicated in obesity.

Muriated saline waters. As a whole these waters stimulate the secretion of the stomach, increase digestion, favor a more complete absorption of foods, and act as diuretics.

Sodic muriated saline waters. Where these waters are very heavily charged with sodium chlorid they are often used for baths, to increase the action of the skin, and by absorption act as a tonic. * * *

Potassic muriated saline waters. * * * Its therapeutic action is very much like that of the sodium salt.

Lithic muriated saline waters. * * * Such waters as these would have the usual action of the muriated saline class, with an intensified diuretic effect due to the lithium.

Calcic muriated saline waters. These usually have sodium predominating. * * * In general debility they act as a tonic. * * * They are used in the treatment of scrofulous diseases and eczema.

Sulphated saline waters. As a class these waters are laxative or purgative, according to the quantity taken, and should generally only be used in moderate amounts. * * * They include: *Sodic and magnesic sulphated saline.* * * * Persons suffering from obesity, dropsy, derangement of the liver and Bright's disease are perhaps the most benefited by this class. *Potassic sulphated saline.* In so far as it is present, it has very much the same effect as the two salts mentioned preceding. *Calcic sulphated saline.* * * * This class of waters forms what is known as the permanently hard group. They have no well-known therapeutic action. *Ferruginous sulphated saline and aluminic sulphated saline.* Iron and aluminum usually occur together when either is present. * * * Since waters containing large quantities of iron and aluminum along with sulphuric acid ions are practically always acid, it is best to consider them under the sulphated acid group.

Nitrated saline waters. The authors have only found one water which belongs to this class. * * * The medicinal action of these waters has not been determined.

Acid waters. This group of waters is principally composed of the ferruginous-aluminic sulphated class, although there are a few acid springs which contain comparatively little iron and aluminum, but quite large amounts of calcium, sodium, and magnesium. These waters are used in relaxed conditions of the mucous membrane, * * *. When a water is desired for its tonic effect it is best to give it in the ferruginous carbonated form, since it is more easily absorbed and assimilated.

Iodic and bromic waters. * * * Waters of this class act as alteratives. * * * They also favor the elimination of mercury and other metallic poisons. The bromic waters also act as sedatives.

Arsenic waters. These waters act as an alterative, increase the appetite and digestion, and improve the whole nutrition of the body. * * * especially valuable in the treatment of anæmia and a number of skin diseases, also chronic malarial poisoning, neuralgia of anæmic origin, scrofulosis, etc.

Silicious waters. The medicinal value of these waters has not been thoroughly investigated, although one or two investigations have been made which seem to show that they would be of value in the treatment of cancer. It has been stated that silica taken internally has caused albumen and sugar to disappear from the urine.

Azotized and oxygenated waters. * * * Both nitrogen and oxygen are present in all waters that have come in contact with the air. * * * Neither of them as they occur in waters has any medicinal value.

Carbon dioxated water. These waters contain free carbon dioxid as distinguished from the carbonated or bicarbonated waters which contain carbon dioxid in combination. Usually the heavily carbon dioxated waters are also bicarbonated, but this is not necessarily true. Free carbon dioxide is present in practically all natural waters to some extent, but in some * * * it is present in very large quantities. Such waters are extremely palatable and large quantities can be drunk without causing a "full feeling." These waters tend to increase the flow of saliva and intestinal fluids. * * * Obstinate cases of nausea are often relieved by the use of this class of waters.

Carburetcd waters. These waters sometimes occur in coal and natural-gas regions. They are not known to have any medicinal value, but are usually considered unfit for drinking purposes.

Sulphureted waters. These waters increase the action of the skin, intestines, and kidneys. They also possess a decided alterative effect. They have been used in the treatment of syphilis, chronic metallic poisoning, rheumatism and gout. They have given excellent results in many cases of skin diseases, hyperaemia of the liver, and in the catarrhal conditions of the pharynx, larynx and bronchi.

As between those enthusiasts who proclaim some particular mineral spring as a cure-all, and those scoffers who say ''it's the mountain air, exercise and change of diet,'' we have the following statement in ''Mineral Resources of the U. S.'' 1911, Part II, page 1192. In summing up a discussion of the therapeutic activities of mineral waters, Mr. R. B. Dole states: ''Some natural waters have therapeutic action that may be attributed to the inorganic substances in solution. Many other waters, however, owe what curative effect they may have to their character as fairly pure waters, free from organic contamination and from deleterious mineral constituents. The amount of inorganic matter that may be present in drinking waters without having appreciable physiologic effect is comparatively great.''

It is hoped that in the not too distant future, investigations may be made on the radioactivity of California's mineral springs—at least at the more important ones—by some official bureau, either federal or state, as has been done by the United States Geological Survey in the case of the Yellowstone Park waters. As shown by the results of the Survey's work (see Bulletin 395) there, radioactivity is not confined to thermal waters only, but some cold waters have this quality also.

Such localities as The Geysers in Sonoma County, Seigler's Springs and Sulphur Bank in Lake County, Calistoga in Napa County, and Sulphur Creek in Colusa County (not to mention some in other parts of the state) would be likely places for conducting such a series of investigations. On no other basis, it would seem, can we explain satisfactorily some of the remarkable cures authentically ascribed to certain mineral springs. Also, because it has been noted that certain waters show greater efficacy when used at the spring direct or shortly after being drawn. This peculiarity is a characteristic of radioactive waters, as the major portion of such activity is not a permanent quality.

Bibl.: R. IV, p. 230; VI, Pt. I, pp. 61-64; VIII, pp. 327-329; X, pp. 230 *et seq.;* XII, pp. 334-337; XIII, p. 511; Reg. of Mines, Lake County; GEOL. SURV. OF CAL. Geology, Vol. I, p. 99; U. S. G. S. Mon. XIII; Bull. No. 32, pp. 202-214; Min. Res. U. S. 1888 to 1912; Water Sup. Pap. 338; "MINERAL SPRINGS AND HEALTH RESORTS OF CALIFORNIA," Winslow Anderson, M.D., 1890.

Adams Springs. These springs are in Sec. 26, T. 12 N., R. 8 W., 7 miles southwest from Lower Lake, and 30 miles north of Calistoga. They are in a beautifully wooded country, as is most of western Lake County, the principal timber being pine, "fir" (*Pseudotsuga taxifolia*), and oak. The springs are in the canyon at the head of Putah Creek, at an elevation of 2660 feet (barometric), and were first taken up by Charles Adams in 1872. The present owner, W. R. Prather, has had the property since about 1888, and states that he has increased his holdings until he at present owns 5000 acres in connection with the resort. There is a well equipped hotel and a number of cottages, with accommodations for a total of 350 guests. The main spring is at the hotel, and is an alkaline carbon-dioxated water very pleasant to drink. Its temperature is 50° F., and it has considerable free carbon-dioxide gas. There are also several other smaller springs. They have been bottling water from the main spring for the past twenty years, but only during the summer season.

Bibl.: R. VI, Pt. I, p. 61; VIII, p. 327; XII, p. 334; XIII, p. 511; R. of M. Lake County, p. 5; U. S. G. S. Bull. No. 32, pp. 203 and 210; Water Sup. Pap. 338, p. 189; ANDERSON (op. cit.), p. 68.

Allen Springs. These springs were formerly operated as a resort, but are now owned by the Allen Springs Club, of Woodland, a private organization, for use only of members and their guests. P. T. Laugenour is president and John Reith, Jr., is secretary. The springs are in Sec. 8, T. 15 N., R. 7 W., in the canyon of Bartlett Creek 3 miles below Bartlett Springs, on the Williams-Bartlett stage road at an elevation of 1930 (bar.). They were first taken up by a Mr. Allen something over thirty years ago. There are numerous strong springs in the bed and side of the creek, 4 or 5 of them having cemented curbs. Gas can be seen bubbling up through the water in the creek for a space of 200 to 300 feet. The following are the temperatures of the principal flows: "White Sulphur," 57° F.; "Soda" 60°; "Soda and Iron'' (3 springs) 63°; ''Allen'' (at club house) 56°. The last named is the one from which water has been bottled for sale.

Bibl.: R. VI, Pt. I, p. 62; VIII, p. 327; XII, p. 334; XIII, p. 511; R. of M., Lake County, p. 5; U. S. G. S. Bull. No. 32, p. 203; Water Sup. 338, p. 198; ANDERSON (op. cit.), pp. 76–78.

Anderson Springs. These springs which are in Sec. 25, T. 11 N., R. 8 W., have been in the possession of the Anderson family since their location in 1873, the present owner being Miss Barbara Anderson. They are picturesquely situated in the timbered section of southwestern Lake County, 6 miles northwest from Middletown and 24 miles north from the railroad at Calistoga, at an elevation of 1525 feet (bar.). There are eight springs in active use, besides several others. The ''Cold Sulphur'' (white), below the hotel, has a temperature of 63° F. The others are mostly above the hotel, and have the following temperatures: ''Iron,'' 103° F.; ''Sour,'' 65°; ''Bellmer,'' 65°; ''Magnesia'' or ''Father Joseph,'' 70°; ''Hot Sulphur and Iron,'' 145°; ''Iron and Magnesia,'' 103°; ''Steam Bath,'' 138°. Around the last two named, there is considerable sulphuretted hydrogen gas escaping. The hotel has accommodations for over 100 people.

Besides the detailed analysis shown in the ''Table of Analyses,'' the ''magnesia'' or ''Father Joseph'' spring carries Epsom and Glauber's salts, also traces of chromium. At the ''steam bath,'' a series of small rooms has been built against the bank, covering the fissures where the hot vapors escape from the rock. The steam enters through holes in the walls and floor. The temperature in these rooms is 138° F. If the thermometer could have been put into the rock fissure itself, a higher temperature would probably have been recorded. The ''hot sulphur and iron'' spring is about 15 feet from the steam bath; and there is a deposit of fine flour sulphur around the inside of the barrel enclosing the spring. The rocks and bank around these springs are encrusted with deposits of salts from the vapors, resembling the similar but larger deposits of such materials at The Geysers in Sonoma County which are but 6 miles in an air-line, northwest of Anderson Springs, on the other side of the range.

Bibl.: R. VI, Pt. I, p. 62; VIII, p. 327; XII, p. 335; XIII, p. 511; R. of M., Lake County, p. 5; U. S. G. S. Bull. 32, p. 203; Water Sup. Pap. 338, pp. 89–91; ANDERSON (op. cit.), pp. 82–89.

Bartlett Springs. Bartlett Springs were discovered in 1869 by Green Bartlett, while on a camping trip. As he was suffering from rheumatism at the time, and found himself benefited by use of these waters, he took up the springs and established a resort there. Though the farthest from the railroad, Bartlett Springs is today the largest and best equipped in accommodations of any of the Lake County resorts.

It is in Sec. 2, T. 15 N., R. 8 W., near the head of Bartlett Creek, a branch of Cache Creek, at an elevation of 2375 (bar.) feet above sea-level. The present owner is the Bartlett Springs Company, office 634 Third street, San Francisco, C. E. McMahan, president, with G. A. Otto, manager, at the springs.

There are two main "roads" to Bartlett Springs: (1) by auto stage, 42 miles from Williams, Colusa County, on the east side; or (2) by auto stage from the railroad at Pieta in Mendocino County on the west, to Lakeport; thence by gasoline launch across Clear Lake to Bartlett Landing; finishing by auto stage, up over the mountain ridge (crossing at an elevation of 4040 feet) to the springs. Leaving San Francisco at 7.45 a.m. one reaches Bartlett's at 4.30 p.m. the same day, by either route. The second is by far the more picturesque, particularly on the return trip in the morning as the machine winds in and out around the many turns of the road. At each turn one gets a new view of Clear Lake and its beautiful mountain setting. From the summit to the level of the lake, a horizontal distance of about 3 miles, is a drop of 2700 feet in altitude.

There are three springs, the principal one having a good strong flow and a little excess gas. Its temperature is 56.5° F., and it is a delightful water to drink—clear and sparkling. It is walled in with a cement curbing and surrounded by a pavement of the same. The whole arrangement makes a unique and picturesque setting (see photo No. 8). For the bathhouse the water is artificially heated. The "Soda-magnesia" spring has a temperature of 59° F.; but the "Aperient" was dry at the time of our visit. It is said to be intermittent and sometimes "roars" with excess gas. Besides these there is a "gas spring," higher up on the hill, which emits a considerable volume of moist carbonic acid gas, but no water.

There are several buildings and a large number of cottages, besides the main hotel, with accommodations for a total of over 500 people. Additions have been made, each of the last two years; yet, the manager reports having had to turn away 200 applicants during the month of July this year (1913). There is a resident physician at Bartlett's during the season, from May 15th to October. The postoffice is in the hotel, and there is a general merchandise store, drugstore, bakery and a butcher shop maintained by the company for the accommodation of cottagers and campers.

The bottling works are below the hotel, the spring being above, giving a good working hydrostatic pressure at the plant. In bottling Bartlett water, it is drawn from the bottom of the spring through a block tin pipe, to prevent the escape of the natural gas that the water contains, and through a Bergfeld filter. The bottles are filled through a tube that extends to the bottom of the bottle, and when filled are at once hermetically closed with crimped caps. Before packing each bottle is carefully examined and all defective ones emptied. It is adapted for exportation. It is free from organic matter and is charged only with its own natural gas. In addition to the water bottled at the spring, a small amount is shipped in barrels to the San Francisco office, and there bottled, carbonated—being labeled "sparkling."

The bottling works are equipped with a gasoline engine for power, a large mechanical bottle washer, labeling machine, belt conveyor (to carry bottles from labeler to packers), and other mechanical appliances.

Photo No. 8. "Bartlett" Spring, at Bartlett Springs, Lake County, California.

Fifteen men are employed and the plant has a capacity of 10,000 bottles per day of nine hours. The bottles are the usual mineral water size (5 per gallon) and are packed in cases of 50.

An ice plant is also installed there. The first two or three years of bottling, two 4-mule teams were required to haul the product to the railroad at Williams. Now, there are from eight to twelve, 8, 10, and 12-mule teams on the road during the five months from May to October.

No water is bottled during the winter and spring months, as the roads are in bad condition and there are no storage facilities at the springs.

Bibl.: R. VI, Part I, p. 92; VIII, p. 327; X, p. 253; XII, p. 335; XIII, p. 511; R. of M. Lake County, p. 5; U. S. G. S. Bull. No. 32, p. 203; Water Sup. Pap. 338, p. 201; ANDERSON (op. cit.), pp. 91–94.

Behr Soda Spring. It is in Sec. 10, T. 13 N., R. 8 W., on the edge of Clear Lake, 5 miles east of Kelseyville, and is owned by John Behr, of Upper Lake. It is not utilized commercially.

Bibl.: R. of M., Lake County, p. 5.

Blue Lakes. At Blue Lakes (Midlake, P. O.) in Sec. 6, T. 15 N., R. 10 W., 18 miles east of Ukiah, are two springs, a "sulphur" and an "iron," the former of which is said to have a temperature of 60° F. The Blue Lakes Realty Company owns the property, with H. W. Kemp, Midlake, manager of the resort, which is located between the upper and lower lakes.

Bibl.: R. of M., Lake County, p. 5.

Bonanza Springs are in Sec. 30, T. 12 N., R. 7 W., between Seigler and Howard Springs, 5 miles southwest from Lower Lake, and 2 miles east of Adams Springs. They are on a comparatively flat ridge in a section of rolling hills, with abundant pine, "fir," oak, alder and manzanita. The elevation is 2400 feet (bar.). These springs have been in use over twenty-two years, the present owners, C. N. E. Ehret and H. Penning having bought it in 1910. At one time there was a large hotel there, but it was destroyed by fire, and at present the springs are used only as a camping resort. No water is bottled for sale. The temperatures of the principal springs are: "white sulphur" 64° F.; "iron and soda" 59.5°; "magnesia" (a well) 66°; fresh water (well) 55°; "borax" and "iron" were dry at the time of our visit, as the result of a succession of three dry years.

Bibl.: R. VI, Part I, p. 92; VIII, p. 327; XII, p. 335; XIII, p. 511; R. of M., Lake County, p. 5; U. S. G. S. Bull. No. 32, p. 204; Water Sup. Pap. 338, p. 190; ANDERSON (op. cit.), p. 100.

Borax Springs. There are borax springs on the edge of Clear Lake, near both Borax Lake and Little Borax Lake (Hatchinhama) but they are not utilized except locally.

Bibl.: R. VI, Part I, p. 63; VIII, p. 327; X, p. 239; R. of M., Lake County, p. 5; GEOL. SURV. OF CAL. Geol Vol. I, p. 99; U. S. G. S. Mon. XIII, pp. 266–268; ANDERSON (op. cit.), pp. 101, 168, 176.

Bynum Spring is at the head of a small branch of Scott Creek, which is dry in summer. The surrounding hills are bare except for chamiso brush. It is 6 miles southwest from Lakeport, in Sec. 9. T. 13 N., R. 10 W., and is reached by a good wagon road, being 14 miles east of Hopland, its railroad shipping point. The spring is named for its locator, who found it about fifty years ago; but bottling began only about five years ago. There is no resort there. The present owner is Geo. W. Crippen, of Richmond. The elevation is 1800 feet. The spring flows about 10 gallons per hour, the temperature being 60° F. It is an excellent table and bar water. There is a little excess gas. The bottling is done by hand, and a hand-operated crowning machine used.

Bibl.: R. of M., Lake County, p. 5; U. S. G. S. Water Sup. Pap. 338, p. 182.

Carlsbad Springs. These springs in Sec. 1. T. 12 N., R. 9 W., 5 miles south of Kelseyville were utilized at one time, but are now abandoned. Mrs. E. McGovern of Kelseyville is the owner.

Bibl.: R. of M., Lake County, p. 5; U. S. G. S. Water Sup. Pap. 338, p. 187.

Castle Springs (Mills). These springs were formerly known under the name of Mills, also Noble's Springs. They are in Sec. 26, T. 11 N., R. 8 W., 7 miles northwest from Middletown, 1 mile above Anderson Springs, at an elevation of 2450 feet (bar.). They were located about thirty years ago, by W. Mills. The property has been in litigation, but is now owned by Mrs. Campbell-Van Luven, who states that it will be reopened next season (1914). A fine, cement-lined swimming pool 25 by 60 feet has been built recently. The ''Big Hot'' sulphur spring which is in a small canyon above the hotel flows about 40,000 gallons per twenty-four hours, and has a temperature of 163° F. at the spring. It is piped to the bath house and swimming tank. Other springs on the place are: ''Sour'' 65° F.; ''black sulphur'' 67°; ''white sulphur'' 66°; ''Vangas'' 66° (much H_2S escapes from bank around this spring); and a small hot spring, uncurbed, issuing from the bank near the large one has a temperature of 153° F. The hotel and cottages will accommodate 75.

Bibl.: R. VIII. p. 328; XII, p. 337; XIII, p. 511; U. S. G. S. Bull. No. 32, p. 206; Water Sup. Pap. 338, pp. 91–93; ANDERSON (op. cit.), p. 194.

Chambers Ranch. On the ranch of C. M. Chambers, in Sec. 24. T. 13 N., R. 10 W., 6 miles south of Lakeport, there are several springs, one of which has been analyzed. They are at present not utilized, except privately.

Complexion Springs are on the Williams-Bartlett stage road, near the eastern boundary of the county, in Sec. 10, T. 15 N., R. 6 W., but they are not utilized, except by occasional camping parties. As the name implies, they are claimed to have the property of improving one's complexion. The water has a milky appearance, similar to some "arsenic" springs. The principal constituents are sodium chloride and ammonia.

Bibl.: R. of M., Lake County, p. 5; U. S. G. S. Water Sup. Pap. 338, p. 297.

Copsey Springs (see *Spiers*).

Crabtree Springs, in Sec. 25, T. 17 N., R. 9 W., about 12 miles northwest from Bartlett Springs, are owned by S. T. Packwood of Upper Lake, who reports that he is planning to build a resort there.

Bibl.: R. of M., Lake County, p. 5; R. XI, p. 61; U. S. G. S. Water Sup. Pap. 338, p. 106.

Dennison (see *Hazel*).

Dollar Springs. These springs, formerly known locally as Warm Springs, are located on Black Mountain, in Sec. 8, T. 11 N., R. 5 W., 11 miles northeast from Middletown. They are said to have been used for many years by Indians. The present owner, B. Norman of Richmond, reports having sent out a trial shipment of bottled water the past summer.

Grizzly Medical Springs. These springs, at one time called "Richardson's" are owned by Samuel Richardson, and are near the eastern line of the county, 5 miles west of Sulphur Creek (Colusa County) post office in Sec. 3, T. 13 N., R. 6 W. Their elevation is 1365 feet (bar.). They were first used forty-two years ago, and the present owner has had them since 1908. He has been bottling water, in a small way, since 1909. Both the "Grizzly" and the "Bath" springs have a temperature of 70° F. Water from the latter is heated artificially for bathing. There are a few cottages and space for campers. There are several other springs not at present utilized. Probably one of these is the "Iodine" spring mentioned in some of the early reports (see Bibliography), as no iodine is indicated in the analyses of either of the springs above named.

Bibl.: R. IV, p. 230; VI, Pt. I, p. 63; X, p. 264; U. S. G. S. Bull. No. 32, p. 205; Water Sup. Pap. 338, p. 193; ANDERSON (op. cit.), p. 183.

Harbin Hot Springs. This is one of the well known groups of springs of Lake County; and is located 20 miles north of Calistoga, 3½ miles northwest of Middletown, at an elevation of 1625 feet (bar.). The springs were first used by white men about fifty years ago, and by the Indians previous to that time. The property is owned by Mrs. Margaret Matthews of Vallejo, and is under lease to Booth, Carr and Booth. There are accommodations for 300 people. No water has been bottled of recent years. There are steam baths and two swimming pools, the larger one being in the open air. One of the steam baths is a covered pool from the "hot sulphur" spring.

The following temperatures were taken at the point of outflow of the individual springs: "hot sulphur," 120.5° F. (stated to flow 1500 gallons per hour); "iron," 118° (60 gallons per hour); "magnesia," 66° (small flow); "cold white sulphur," 76° (new spring, small flow); "mud foot bath," 101° in water on top and 121° in mud and fine rocks below. There is also a fresh water spring which fills a 30,000 gallon tank in two days (used for fire purposes). The "arsenic" spring was caved in at the time of our visit.

Bibl.: VIII, p. 327; X, p. 230; XII, p. 336; XIII, p. 511; R. of M., Lake Co., p. 6; U. S. G. S. Bull. No. 32, p. 205; Water Sup. Pap. 338, pp. 93–95; ANDERSON (op. cit.), pp. 164–168.

Hachinhama (see *Borax Springs*).

Hazel Springs were formerly known locally as Dennison Springs. They are in Sec. 26, T. 16 N., R. 9 W., 6 miles northeast of Upper Lake, and are owned by Amos Ogden. He reports preparations being made to develop and utilize the springs, also to bottle the water.

Bibl.: U. S. G. S. Water Sup. Pap. 338, p. 202.

Highland Springs are 14 miles east of Pieta on the main stage road to Lakeport. The springs are in Sec. 31, T. 13 N., R. 9 W.; but there are 2300 acres in the property which is maintained in the nature of a hunting and fishing preserve in connection with the resort. Craig & Stephens, Inc., of Woodland, are the owners, with W. I. Allen, manager. There is a resident physician during the summer season. There are accommodations for 315 guests. No water is bottled for sale.

There are twelve principal springs in active use, and over twenty others. All have more or less excess carbonic acid gas bubbling from them—the "Magic" spring being especially vigorous. The temperatures are: "Neptune," 79° F.; "Iron," 73°; "Diana," 80°; "Seltzer," 61.5°; "Kidney," 80°; "Magic," 80°; two "Magnesia," 71.5° and 73° (20 inches apart); "Sulphur," 59.5°; "Dutch" or "Ems," 75°, and "Arsenic," 77°. The fissures from which these last two flow are but

18 inches apart in the edge of the creek bed, and are unique not only in situation but in appearance as well (see photo No. 4). The Dutch is crystal clear, while the Arsenic is milky. The springs at Highland are principally in serpentine. Gas is seen bubbling up through the water in the creek at several points. At places in the serpentine were observed rounded nodules of the original, unaltered sedimentaries (sandstone and shale), as noted by Becker in U. S. G. S. Mon. XIII (pp. 277 and 278).

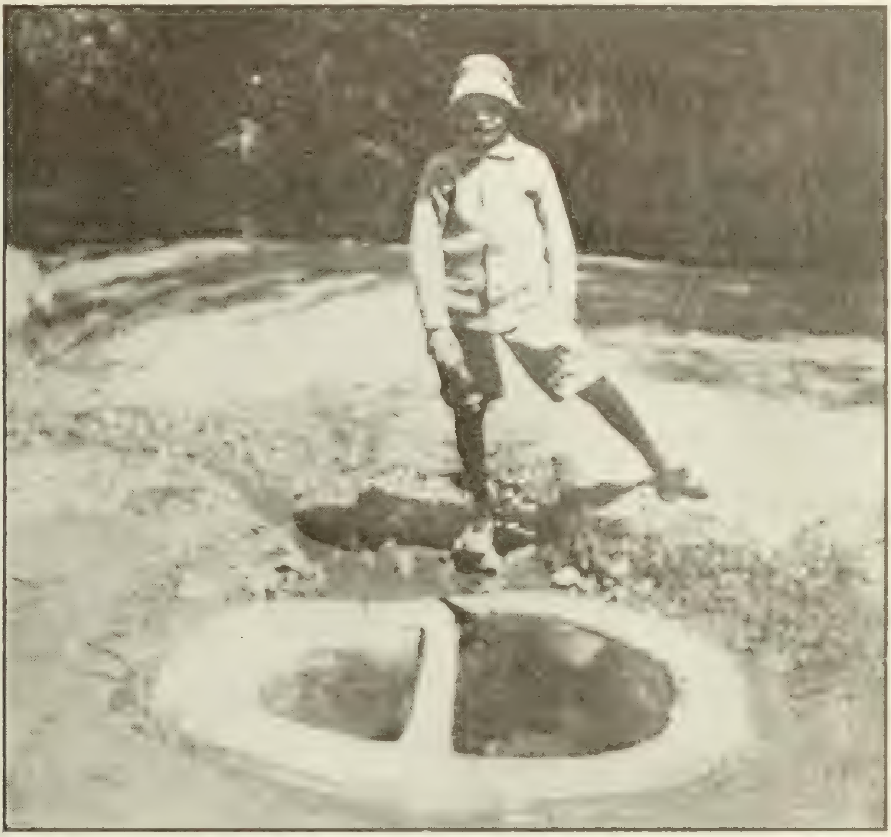

Photo No. 4. "Arsenic" and "Ems" springs, at Highland Springs, Lake County, California.

Bibl.: R. VI, Part I, p. 62; VIII, p. 328; XII, p. 336; XIII, p. 511; R. of M., Lake County, p. 6; U. S. G. S. Bull. No. 32, pp. 205, 212; Water Sup. Pap. 338, pp. 183–185; Anderson (op. cit.), pp. 169, 175.

Hoppin Estate. There are two springs on land owned by the Hoppin Estate, adjoining the Bartlett Springs property. They are about 100 feet apart, and about 100 yards from Bartlett's "soda-magnesia." They are not utilized at present, except locally. These are the two springs included in Register of Mines of Lake County (p. 5) under Bartlett, as "Iron, No. 4" and "Magnesia, No. 5." Their temperatures are: "magnesia," 60° F.; "iron," 59°.

Bibl.: U. S. G. S. Water Sup. Pap. 338, p. 201.

Hough Springs. These springs are on the main Williams-Bartlett stage road, 8 miles east of the latter. in Sec. 10, T. 15 N., R. 7 W., elevation 1800 feet (bar.). They are on the north fork of Cache Creek, at a point where the canyon widens out into a flat of several acres in extent. The springs are on the hillside near the hotel, the two principal ones being: "soda," 60° F.; and "iron and magnesia," 61°. Besides these, the well at the hotel is an "iron" water, and there is a "white sulphur" spring in the creek bank, below, not at present utilized. The hotel, cottages, and tents will accommodate about 150. The soda spring is an excellent "seltzer" water, with plenty of snap due to the large excess of carbonic acid gas; and has a picturesque natural grotto around it (see photo No. 10). None of the water is bottled. Bartels Bros. are the owners.

Photo No. 10. Soda Spring and Grotto at Hough Springs, Lake County, California.

Bibl.: R. VI, Pt. I, p. 63; R. of M., Lake County, p. 6; U. S. G. S. Bull. No. 32, p. 206; Water Sup. Pap. 338, p. 197; ANDERSON (op. cit.), p. 180.

Howard Springs. Howard Springs owe their name to their first locator, who took them up about 1871. They are owned by W. J. Laymance of Oakland, and R. J. Yates is lessee. They are in Sec. 30, T. 12 N., R. 7 W., 7 miles southwest of Lower Lake, and 14 miles northwest from Middletown, at an elevation of 2150 feet (bar.). They are on the edge of a small basin, surrounded by rolling hills. There are something like forty separate flows, but fourteen of them, however, being in active use. The principal ones are: "Excelsior" (lithia), 79.5° F.; "Alum," 80°; "Alum-Sodium," 82°; "Borax," 86°; "Twins," 82° and 102° ("Prince and Princess," about 7 feet apart); "Eureka," 108°; "Hot Sulphur and Iron," 110°; "Old Man's Friend" (Neptune in list of analyses), 87°; "Bohemian," 71°; "Soda," 65° (about ¼ mile distant from others). Water from the "lithia," "Eureka," and "Bohemian" were bottled at one time—previous to 1911. There are accommodations for 80, mostly in cottages. The bath house utilizes the water from the hot iron and sulphur spring.

Bibl.: R. VI, Part I, p. 63; VIII, p. 328; XII, p. 337; XIII, p. 511; R. of M., Lake County, p. 6; U. S. G. S. Bull. No. 32, p. 206; Water Sup. Pap. 338, p. 95; ANDERSON (op. cit.), pp. 180 and 181.

Mills Springs (see *Castle Springs*).

Newman Spring. This place is known locally as "Soap Creek," on account of borax being a prominent constituent in the water. It is used as a bathing resort, there being a walled-in swimming pool. It is 1½ miles north of Bartlett Springs, in Sec. 35, T. 16 N., R. 8 W., and is owned by Geo. Young of Bartlett Springs, being leased to W. W. Tallman.

Bibl.: R. X, p. 254; R. of M., Lake County, p. 6; U. S. G. S. Water Sup. Pap. 338, p. 202.

Pierson Springs (see *Saratoga Springs*).

Red Wing Spring (see *Spiers Springs*).

Richardson (see *Grizzly*).

Saratoga Springs (Pierson). About twenty years ago these springs were known under the name of Pierson. The post office at the springs is called Bachelor. They are in Sec. 4, T. 15 N., R. 10 W., 22 miles north of east from Ukiah and 6 miles west of Upper Lake, at an elevation of 1500 feet (bar.). John Martens Estate is the owner. The flow of the springs has not been measured, but it is stated that the strongest one can not be bailed out completely by hand with a 2-gallon bucket. No water is bottled for sale. There are 13 springs in use, the principal ones being: "magnesia" (No. 1), 59° F. and (No. 2) 61.5°;

"arsenic" 60°; "sulphur" 60°; "soda" 61.5°; " iron" 61.5°; "seltzer" 59°.

Bibl.: R. VI, Part I, p. 63; VIII, p. 328; XII, p. 337; XIII, p. 511; R. of M., Lake County, p. 7; U. S. G. S. Bull. No. 32, p. 207; Water Sup. Pap. 338, p. 179; ANDERSON (op. cit.), pp. 220 and 242.

Seigler Hot Springs. This resort is owned by the Seigler Springs Company, with A. J. McGill, president; Robert Forbes, secretary, and W. H. Roberts, manager. It is in Sec. 24, T. 12 N., R. 8 W., 5 miles southwest from Lower Lake, 30 miles north of Calistoga, and at an elevation of 2230 feet (bar.). There is quite a variety of springs here, both cold and hot. The principal ones are: "hot iron" 107° F.; "hot sulphur" 107°; "small sulphur" 118.5°; "big sulphur" 126°; "lithia" 67°; "soda" 64° "magnesia" 72°; arsenic" 94°; one not named 97°; "geyser" was choked up. At the "Big Sulphur" spring there is considerable excess gas escaping, and there is a large sinter deposit beside it. This spring is the principal one supplying the swimming pool (30 feet wide, 200 feet long, and 3 to 10 feet deep) made by damming the small ravine at the upper end of which several springs issue. Besides this, several of the other springs have stone bathhouses built over them, large enough for swimming exercise. The hotel is supplied with farm and dairy products from the ranch maintained as a part of the resort, comprising a total of 700 acres. There are accommodations for 250 people. No water has been bottled for sale, but it is stated that they contemplate doing so. There is a body of light

Photo No. 17. Hotel at Seigler Hot Springs, Lake County, California.

colored, volcanic tuff a short distance from the hotel, which has been used for building purposes around the resort, including the main dining room and a part of the hotel (see photo 17).

Bibl.: R. VI, part I, p. 63; VIII, p. 328; X, p. 230; XII, p. 337; XIII, p. 511; R. of M., Lake County, p. 7; U. S. G. S. Bull. 32, p. 207; Water Sup. Pap. 338, pp. 96–98; ANDERSON (op. cit.) p. 243.

Soap Creek (see *Newman*).

Soda Bay Springs. At Soda Bay on the west shore of Clear Lake, 4 miles northeast of Kelseyville, are a number of ''soda'' springs, both on shore and out in the lake. One, particularly of note, out in the lake, by reason of the large excess of carbonic acid gas escaping raises the level of the water about a foot over an area of a square yard. These springs are not utilized except locally.

Bibl.: R. VIII, p. 328; X, p. 242; R. of M., Lake County, p. 7; ANDERSON (op. cit.) p. 245; U. S. G. S., Water Sup. Pap. 338, pp. 191–192.

Spiers or Red Wing Spring (Copsey). This was originally known as Copsey's Spring, from the locator. The land adjacent to the spring and the riparian rights have been in litigation between Joshua Spiers and M. Hoberg (of Cobb post office); and at the time of our visit both were bottling water from the spring, under the name of ''Spiers'' and ''Red Wing,'' respectively. The temperature of the water is 80° F. The hotel is owned and operated by Hoberg. There is a second, smaller spring near-by not utilized. They are on Seigler Creek, on the opposite side from the stage road, 8 miles west of north from Middletown, in Sec. 5, T. 11 N., R. 7 W., elevation 1380 feet (bar.).

Bibl.: R. of M., Lake County, pp. 5 and 7; U. S. G. S., Water Sup. Pap. 338, p. 190.

Sulphur Bank (see under *Quicksilver*).

Witter Springs. The first authentic record of use of these springs by white men in 1862. They are in Sec. 5, T. 15 N., R. 10 W., 21 miles east of Ukiah and 7 miles west of Upper Lake, at an elevation of 1800 feet (bar.). The property is owned by Witter Medical Springs (Inc.), W. F. Detert, president, and W. C. Marsh, secretary, with offices at 311 California street, San Francisco. There are several springs, all cold, but the principal one, ''Witter,'' is purely a medicinal water, owing to its high mineral content (1019 grains per gallon), and can not be used freely. This is the one which has been bottled up to the present time. The ''Humming Bird'' spring is practically fresh water, having only 24 grains of mineral per gallon, and it is proposed to blend some of this with the "Witter" water and bottle it, carbonated, for table use. Witter water is put up in a special 24-ounce bottle, and packed 36 in a case. There is a fine, large hotel here of 113 rooms; and there are 15 cottages.

Bibl.; R. VI, Part I, p. 64; VIII, p. 329; XII, p. 337; XIII, p. 511; R. of M., Lake County, p. 7; U. S. G. S. Bull 32, p. 209; Water Sup. Pap. 338, pp. 177–179; ANDERSON (op. cit.) p. 265.

In addition to the springs described above there are innumerable mineral springs in the county, both on unlocated ground and on patented land, which are not utilized at present or at least only privately. Among these may be mentioned the following:

"Alum" Springs, in Sec. 11, T. 14 N., R. 7 W., Hiram Kennedy, Lower Lake, owner.

Astorg, near Glenbrook, in Sec. 28, T. 12 N., R. 8 W.

Chalk Mountain, carbonated springs on Chalk Mountain, 11 miles east of north from Lower Lake, near the Dinsmore and Alum.

Dinsmore (soda and iron) in Sec. 11, T. 14 N., R. 7 W., R. Dinsmore, Lower Lake, owner.

Elliott (soda and iron) near Highland Springs, in Sec. 8, T. 12 N., R. 9 W., C. C. Hopkins and C. E. Miller, owners.

England (same as Elliott).

Glen Alpine, on west bank of Scott Creek, 6 miles southwest of Lakeport, on the Hopland road.

Gordon, in Sec. 20 T. 11 N., R. 7 W., Estate of E. A. Hoffman, owner.

Hayvilla Sulphur Spring, 5 miles northwest of Upper Lake.

Kelseyville (soda), in Sec. 14, T. 13 N., R. 9 W., Farmers' Savings Bank, Lakeport, owner.

Lee Soda, in Sec. 33, T. 14 N., R. 10 W., J. F. Lee, Lakeport, owner.

Lyons, Mrs. J. H. Lyons, owner; 6 miles north of Lakeport.

McIntyre Ranch, 6 miles from Kelseyville; an iron spring. Murdock McIntyre, owner.

Morton (See *Roaring Soda*).

Paramore (soda and iron), near Upper Lake in Sec. 21, T. 17 N., R. 9 W., E. R. Smith, owner.

Quigley Soda Springs. On the Quigley ranch at Arabella.

"Roaring Soda" (also called *Morton*), near Hullville, in Sec. 15, T. 18 N., R. 10 W., J. M. Macdonough, owner. Used by occasional camping parties.

Royal, in Sec. 7, T. 16 N., R. 8 W., Dr. E. S. Holway, Colusa, owner.

Spring Hill Farm Resort, a small "iron and magnesia" spring in Sec. 8, T. 10 N., R. 8 W., near Middletown, L. S. Peterson, owner.

Sulphur Spring, near Blue Lakes Resort.

At Upper Lake, water for domestic purposes is obtained from numerous artesian wells. They all carry more or less mineral, principally iron and soda.

The surface water is stated to stand at about 6 feet depth, and the artesian stratum at about 50 feet. West of town the two string bean canneries use artesian wells for irrigating. One of them (Mendenhall's) has sixteen wells on 100 acres; and it is said that when these sixteen (about ½ mile distant) are flowing that the flow of the wells in town is noticeably lowered. A mile south of town on the Taylor place there is a very vigorous artesian "soda" well, with considerable excess gas. It is capped, and not utilized at present.

On the road from Lower Lake to Knoxville, three or four mineral springs were passed, one of them called *Baker Soda Spring*. They are not utilized. Two of them had large calcareous sinter deposits below them.

Bibl.: R. X., pp. 230 *et seq.*, R. of M., Lake County, pp. 5–7; U. S. G. S. Bull. 32, pp. 203, 205, 208, 209; Water Sup. Pap. 338, pp. 93, 181, 182, 186, 188, 196, 197, 202–204, 268, 358; Anderson (op. cit.) pp. 164, 176, 247, 267, 269.

NATURAL GAS.

At Kelseyville is a gas well, which was used for a time for illuminating purposes; but the gas was not dried, and it is stated that acid in the moisture corroded the supply pipes. The gas flow was struck at a depth of 158 feet. The buildings connected with it were burned, and have not been rebuilt. The gas is also said to have been tried in a gas engine. It is not utilized at present; and the well is capped.

Bibl.: R. VII, p. 184; VIII, p. 326; X, pp. 241, 271; XI, p. 63; Anderson (op. cit.) pp. 182, 266–269; U. S. G. S., Water Sup. Pap. 338, p. 181.

ONYX.

There is a small undeveloped deposit of "onyx marble" in Sec. 12, T. 18 N., R. 10 W., near Hullville.

Bibl.: Reg. of Mines, Lake County, p. 3.

PETROLEUM.

There are oil seepages reported on the east, southeast and northeast of Morgan Valley, in the southeastern part of Lake County. The valley has flat-lying sandstones, and it is thought they "may have oil underneath."

Some of the seepages have been prospected, and a small amount of high grade oil (paraffine base) said to have been obtained. Some light oil was found a few miles southeast of here, in the Knoxville quicksilver mine, on the 400-foot level at the sandstone contact, and was used as a lubricant around the mine machinery.

QUICKSILVER.

Prospecting and exploitation of quicksilver deposits in Lake County began in the early sixties, and the Abbott mine was a producer as early as 1870. There was no notable production, however, until 1873. As will be noted by reference to the Table of Mineral Production, quicksilver mining was most active in this county from 1875 to 1882. The high-water mark in the price of quicksilver in California was reached in 1874 (the highest quotation being $118.55 per flask), with $105.18 the average San Francisco figure for that year. This was preceded by an average of $80.33 in 1873, and followed by $84.15 in 1875. The following year it dropped to $44. The low record sales price was $25.25 in 1879, but 1882 was the lowest year, with average of $28.23. The average price for 1913 was $40.23.* The variations in the market price of quicksilver have been decidedly erratic, as will be noted by reference to the table in Bulletin 27, page 10.

There was a revival of quicksilver mining in Lake County between the years 1891 and 1896; but beginning with 1905 there has been a rapid decline, until at the present time it has reached an almost insignificant figure. There were but two producers in 1913—the Helen and the Wall Street, both of them being near Middletown. It may be noted here that in some of the early reports and press notices the Knoxville mines (Manhattan, Lake, Redington, Boston) were erroneously referred to as being located in Lake County. They are in Napa County.

The principal consumption of quicksilver is in the manufacture of fulminate for explosive caps, in the recovery of gold and silver from their ores by amalgamation, the preparation of certain drugs, and the manufacture of vermilion, of electric lighting apparatus and scientific

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*The average price for the first seven months of 1914 was $38.61, the monthly figure varying between $39.25 for January and $37.50 for July. The outbreak of the war in Europe in August at once changed the aspect of the quicksilver situation, as it did many other lines. The monthly averages to date since that have been as follows:

August, 1914	$80 00
September	76 25
October	53 00
November	55 00
December	53 10
January, 1915	51 90
February	60 00
March	78 00
April	77 50
May	75 00
June	90 00
Closing June figure, per flask	90 00

W. W. B., July 1, 1915.

apparatus. A new and interesting use now coming into vogue is for "floating" the revolving lights of lighthouses. About 600 pounds of quicksilver are required (depending on the size of the light)—being placed in a circular groove or channel. The lighting unit is set on a pontoon which, in turn, rests and revolves on the mercury. As the metal is not consumed, the loss after installation is insignificant.

In "Mineral Resources of the United States for 1912" H. D. McCaskey says:

> Owing to the generally low prices prevailing, the domestic quicksilver industry was not particularly prosperous in 1912. The great majority of the producers are operating old mines in which high grade ore is now rarely encountered, and there was no new rich ore shoots reported for the year. In most cases special skill is required to prevent the plants running at a loss. * * * Although each well-developed property is equipped with its own plant and presumably run at lowest costs, the margin of profit in many cases is so small upon low-grade ores that during periods of low prices the mining activity is likely to be considerably curtailed. * * * It is true that further improvements in metallurgical treatment, particularly in preventing furnace losses, should result in a better margin of profit. But little improvement can be made with low market prices and uncertainty of ore supplies. The domestic market for quicksilver appears to demand from 20,000 to 25,000 flasks for consumption per annum. The foreign market is not profitable to American producers in competition with large European supplies available at lower prices. At low prices and normal output there is little importation, but at high prices importation of foreign supplies reacts to curtail output by cutting prices to a low margin of profit. It would seem, therefore, that unless rich ore, workable under favorable conditions at a large profit, be available, or industrial chemistry find new uses for the metal and an increase in domestic demand results thereby, the present producers must continue to operate under somewhat unfavorable conditions, and new producers and small mines must compete with established mines and plants now operated presumably at minimum costs and with special skill and knowledge of the art.

The increasing adoption of the cyanide process in place of amalgamation in the treatment of gold and silver ores, has materially decreased the demand for quicksilver of recent years, particularly in the western United States and in Mexico. The present low tariff, of $5.25 per flask, also affects domestic prices. (See Min. Res. of U. S., 1911, Part I, p. 917.)

As to metallurgical improvements in the reduction of quicksilver ores, besides those looking to the prevention of furnace losses, the question of concentration will no doubt play an important part in the near future. Egleston ("The Metallurgy of Silver, Gold and Mercury in the United States, Vol. II, 1890, p. 804") says: "The attempts of mechanical concentration of quicksilver ores have usually not been successful, because cinnabar is so friable that a greater portion floats off with the water." Just there has been the mistake—too fine crushing or grinding. *Grinding* should be avoided. In the writer's opinion rolls are best adapted for crushing cinnabar bearing ores, as they give a better average product with a minimum of fines. G. V. Northey at the Manzanita mine at Sulphur Creek, Colusa County (see Bull. 27, pp. 198-202; also Eng. and Min. Jour. Vol. 96, p. 783), proved conclusively that cinnabar can be concentrated successfully and handled economically, even using so crude a device as the old Gilpin County bumping table. Also, at the present time, concentration is being practiced at both the Ætna and the Oat Hill mines in Napa County (see under Napa County).

Of course, there are a number of details to be worked out, not only in the ore dressing end, but in the reduction of the metal from the concentrates. This material, because of its high specific gravity and its finely divided condition, packs in the retort and needs some sort of rabbling or shaking up to allow of a complete expelling of the quicksilver. So far only retorts have been used—both "D" and pipe. Possibly some form of a rotary roaster may be evolved; or, a small tile shaft furnace of the Hüttner-Scott type, but with a narrower shaft and a narrow "shelf-slit."* There are a good many quicksilver properties in California idle as well as operating, particularly in Napa, Lake and Sonoma counties, where it would seem worth while to investigate the feasibility of concentration. Then, too, there are the mines like the old Rattlesnake and the Socrates, in Sonoma County, whose ores contain a large percentage of native quicksilver. Some scheme of washing and settling, or concentrating would seem to be the solution of the problem of dressing these ores.

There are four recognized quicksilver districts either wholly or in part located in Lake County: (1) *Mayacmas*, the largest, is in southwestern Lake and extends over into northeastern Sonoma, and northwestern Napa; (2) *Clear Lake* district is around the eastern, southern and southwestern sides of Clear Lake; (3) *Knoxville* district is at the junction of Lake, Yolo, and Napa, being principally in the last named; (4) *Sulphur Creek* district is almost wholly in Colusa but includes the Abbott mine which is on the eastern edge of Lake County.

Bibl.: State Mining Bureau Reports IV, pp. 328-344; V, pp. 95, 96; VI, Part II, pp. 72, 73; VIII, pp. 324, 325; X, pp. 238, 239, 270; XI, pp. 61-65, 239; XII, p. 360; XIII, pp. 595-597; Reg. of Mines, Lake County, p. 3; Bull. 27, pp. 35-42, 46-72, 197-255. U. S. G. S. Mon. XIII; Min. Res. of U. S. 1883, pp. 389, 395; 1884, pp. 492, 494; 1888, pp. 97-99; 1891, pp. 117-121; 1892, pp. 138-168; 1902, pp. 251, 252; 1906, p. 497; 1907, Part I, p. 679; 1908, Part I, p. 686; 1909, Part I, pp. 552, 553; 1910, Part I, pp. 697, 698; 1911, Part I, p. 901; 1912, Part I, pp. 940-942; An. Rep. XVI, Part III, pp. 598, 599; XXI, p. 277.

GEOL. SURV. OF CAL., GEOLOGY, Vol. I, pp. 96-100; Vol. II, pp. 124, 125.

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*Since the above was written, the author has seen such a furnace in successful operation at the New Idria quicksilver mine in San Benito County, for treating soot instead of retorting it. The tile aperture is 3-inch instead of 6-inch as in the larger furnaces. This furnace has a capacity of 9 tons, and 8 tons of fine ore are mixed with each ton of dried soot on charging.

Min. Res. West of Rocky Mts., 1868, p. 266; 1873, p. 11; 1874, pp. 30 *et seq.;* 1875, pp. 13-20, 173-178, 493; 1876, pp. 18-21.
Trans. A. I. M. E. XXII, p. 86; XXIII, pp. 225 *et seq.;* XXXIII, p. 751; Genesis of Ore Deposits, pp. 32, 66, 256.
Richard's "Ore Dressing," Vol. II, p. 1074.
Min. and Sci. Press, May 27, 1905. Eng. and Min. Journal, Vol. 96, pp. 783, 828.
American Jour. of Science, Vol. XXIV, 3d Series, pp. 23 *et seq.*

An extended bibliography on quicksilver for North America is given in Mineral Resources of the United States 1910, Part I, pp. 705-710; 1911, Part I, p. 920.

Abbott Mine. The Abbott mine is on the eastern border of Lake County, in Sec. 32, T. 14 N., R. 5 W., about 1 mile in an air line and 2 by the road from Sulphur Creek post office, Colusa County. It was formerly operated by the Empire Consolidated Quicksilver Mining Company. Jas. H. Boyer, 1106 Merchants' National Bank Building, San Francisco, R. A. Boggess et al. are owners; but the property has been in litigation for some time, and apparently is still unsettled. The plant was shut down in 1906, after having been in operation (the last period) for about sixteen years. The mine was discovered in 1862, and began production in 1870, continuing to 1879. It was idle from 1879 to 1889. The Disturnell is included with the Abbott in the property. The mine is credited with a total production of 30,465 flasks. The underground workings are quite extensive, the greatest depth, however, being only 350 feet below the collar of the "Boggess" shaft. As the mine and adjacent ground has been fully described in several reports previously published, and there being no new developments since, details of the geology will not be entered into here, except to recall to notice the occurrence of a light, inflammable hydrocarbon gas in considerable quantities here, an unusual feature among metal mines (at least, as regards quantity), though other hydrocarbons, and bitumens are not uncommon in quicksilver mines. The reduction equipment consists of a 48-ton Scott furnace, with an ore drier located between the crusher and furnace.

Bibl.: R. IV, p. 336 (Table); XI, p. 239; XII, p. 360; XIII, p. 595; Bull. 27, pp. 46-48; R. of M., Lake County, p. 3; U. S. G. S. Mon. XIII, p. 368; Min. Res. of U. S. 1902; GEOL. SURV. OF CAL. GEOLOGY, Vol. II, p. 124; MIN. RES. W. OF ROCKY MTS. 1876, p. 19.

American (see *Helen*).

Anderson Prospects, owned by members of the Anderson family of Anderson Springs. They are in Secs. 25 and 35, T. 11 N., R. 8 W., near Middletown, but have not been developed.

Bibl.: Bull. 27, p. 48.

Bacon, abandoned. R. of M., Lake County, p. 3; Rep. IV, table op. p. 336.

Baker Mine. In Sec. 16, T. 12 N., R. 6 W., 6 miles southeast of Lower Lake. It is owned by the Baker Quicksilver Mining Company. No work, except annual assessments has been done for several years.

Bibl.: R. XI, p. 67; XII, p. 360; XIII, p. 595; R. of M., Lake County, p. 3; U. S. G. S. Mon. XIII, p. 368; GEOL. SURV. OF CAL. GEOLOGY, Vol. II, p. 125.

Bear Canyon (see *Thorn*).

Big Injun Group, the *Big Injun* of the New Phoenix Mining Company and the *Digger Injun* of the Congress Mining Company, have been idle for several years. They are west of Middletown, and near the Helen mine.

Bibl.: Bull. 27, p. 50.

Bradford (see *Mirabel*).

The *Bullion* mine is 4 miles southwest of Middletown, between the Mirabel and Great Western, Ralph H. Read, Middletown, owner. It was formerly worked by the Mirabel Company, and had been abandoned for several years, but was relocated in August, 1913.

Bibl.: R. XII, p. 360; XIII, p. 595.

Chicago Mine (Ural). This property is owned by the Chicago Quicksilver Mining Company, 522 Bank of San Jose Building, San Jose, Cal. It is in Sec. 1, T. 10 N., R. 8 W., about ½ mile west of the Wall Street mine, near Middletown. It has been idle for some time. The last operations here were in 1911 on the construction of a fine-ore furnace of 15 tons capacity, with concrete walls. The furnace was not finished, and consequently never operated. It would be interesting to note the behavior of the concrete when heated. It looks to be an experiment with rather a doubtful outcome.

Bibl.: R. XIII, p. 595; Bull. 27, p. 51; R. of M., Lake County, p. 3; U. S. G. S. Min. Res. of U. S. 1909, Part I, p. 552; 1910, Part I, p. 697; 1911, Part I, p. 901; 1912, Part I, p. 940.

Destinell (see *Abbott*).

Digger Injun (see *Big Injun Group*).

Franklin (see *Jewess*).

Great Western Mine. The Great Western mine is 4 miles southwest of Middletown, 2 miles northwest of the Mirabel, at an elevation of 1860 feet. This mine had the longest continuous record as a producer of any quicksilver mine in Lake County. It was opened up in 1873, and was a constant producer up to 1909. It is credited with a total yield of 98,296 flasks. The last quicksilver produced by this mine was a few flasks recovered in 1912 in cleaning up around the old furnaces. The company has been disincorporated, the furnaces torn down, and the mine abandoned as being worked out. As might be expected from its output record, the Great Western has extensive underground workings, and to a depth of 750 feet. The mine and its geology are described at some length in the reports noted under Bibliography. The property was equipped with a 40-ton Litchfield furnace.

Bibl.: R. X, p. 270; XI, p. 64; XII, p. 361; XIII, p. 595; Bull. 27, pp. 52, 53; R. of M., Lake County, p. 3; U. S. G. S. Mon. XIII, pp. 358-362, 470; Min. Res. of U. S. 1883, 1884, 1892, 1902, 1906, 1907, Part I, 1908, Part I; 1909, Part I; 1910, Part I; 1912, Part I; MIN. RES. WEST OF ROCKY MTS., 1874, 1875, 1876.

Helen Mine (*American*). The Helen mine, owned by Andrew Rocca, is in Sec. 1, T. 10 N., R. 8 W., 6 miles west of Middletown, at an elevation of 2675 feet (barometric reading at bottom of furnace). It consists of two claims, the Helen and the Austin, which were patented in 1874 by Pushbecker, later sold to the American company and to the present owner in 1900. The property includes between 600 and 700 acres (partly timbered) besides the mineral claims' area. The timber, somewhat scattered for the most part, consists of pine, oak, madrone and "fir." The mine is at the head of the north branch of Dry Creek. Its first recorded production was 128 flasks in 1873. The mineralized ledge is 100 to 200 feet wide, in serpentine, and has a black gouge on the hanging-wall. The vein outcrop is prominent, and strikes a little north of west, dipping to the south at 30° to 40°. There are two main levels at present operated, both being by tunnels, one of which is in 2000 feet giving a depth of 316 feet below the outcrop. They have two ore-shoots—one on the footwall side 100 feet long by 40 feet wide on which they have gone down 90 feet; and one on the hanging, 200 feet long by 40 feet wide. The ledge has been proven underground by drifting, for 1000 feet in length. The ore is cinnabar, intermixed with more or less pyrite, and occurs in seams, sometimes an inch or two thick, of solid cinnabar. These seams are approximately parallel to the ledge, and are crossed at high angles by other and rather minute ore seams. The serpentine is in part silicified and carries lenses of hard, fine-grained black "jasperoid."

At the time of our visit (August, 1913), both the mine and the furnace were in operation, with 16 men, all told, at work—9 underground, 3 on top, and 4 on the furnace. On the outcrop some good ore was being stoped out to the surface. The furnace is a 50-ton Scott (see photo No. 19), and has special condenser arrangements designed by Mr. Rocca, in which the draft is controlled by dampers. It is said to work satisfactorily. The owner states that the ore being reduced averages 0.6 per cent quicksilver, and that he can handle at a profit ore carrying down to 0.25 per cent of the metal. Soot from the condensers, and occasional small lots of rich ore are treated in "D" retorts of 1000 pounds per day capacity. A small gasoline engine, run intermittently, furnishes power for the rock breaker. The furnace consumes 1¼ cords of firewood per twenty-four hours. The ore is trammed, horse-drawn, from mine to furnace in trains carrying 3 tons per trip. As the upper parts of the mine are difficult to work on account of water in the wet season, only development work on the lower levels is done in winter. The mine is credited with a total production of something over 5000 flasks to date.

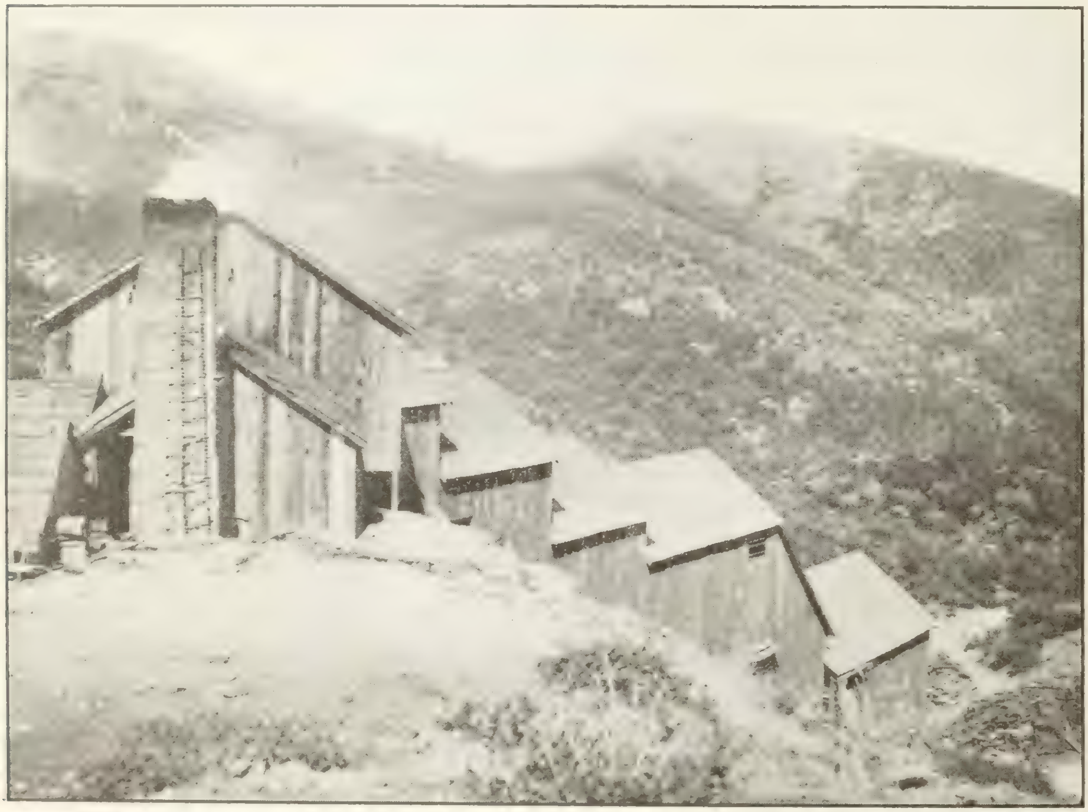


Photo No. 19. Fifty-ton Scott furnace at the Helen Mine, near Middletown, Lake County, California. Old dumps of the Wall Street Mine in the distance.

Bibl.: R. XII, p. 362; Bull. 27, p. 55; R. of M., Lake County, p. 3; U. S. G. S. Mon. XIII, p. 375; Min. Res. 1902, 1907, Part I; 1908, Part I; 1909, Part I; 1911, Part I; 1912, Part I, pp. 940–942; Min. Res. W. of Rocky Mts. 1874, p. 30.

Jewess Prospect (*Franklin.*) It is near the Helen and Wall Street mines, but so far as known has never produced any quicksilver. It has been idle several years.

Bibl.: Bull. 27, p. 157.

King of All Group. This group owned by Lem Stanley of Lower Lake is in Secs. 29 and 32, T. 12 N., R. 7 W., about 10 miles north of Middletown and 1 mile southeast from Howard Springs. None but assessment work has been done for several years. The geology is described in Bulletin 27.

Bibl.: Bull. No. 27, p. 57; R. of M., Lake County, p. 3; U. S. G. S. Min. Res. 1912, Part I, p. 940.

Lucitta Mine (*Uncle Sam*). The Lucitta group of four claims (also known locally as the Uncle Sam), is owned by the Mount Sam Mining Company, and is located on the south slope of Mount Konocti (or Uncle Sam), in Secs. 20 and 21, T. 13 N., R. 8 W., about 7 miles southeast of Kelseyville. The mine has not been worked recently nor has it reported any production for several years past. The geology is described in Bulletin 27.

Bibl.: R. V, p. 96; Bull. 27, p. 58; R. of M., Lake County, p. 3.

The *Maypole* prospect, 7 miles west of Middletown has been abandoned.

Bibl.: R. XIII, p. 596.

The *Middletown* prospect, half a mile southwest from the Jewess, has been abandoned.

Bibl.: Bull. 27, p. 59.

Mirabel (*Bradford*) *Mine.* This mine was first opened up in 1887, as the Bradford, and later renamed Mirabel, being owned by the Standard Quicksilver Company. It is 4 miles south of Middletown. For ten years it was one of the important producers of Lake County, but in 1897 was abandoned as worked out; and the mine has filled with water. In 1908 a small production was reported as having been made from a clean-up around the old furnace. The property has yielded a total production of about 30,600 flasks. Underground, a vertical depth of 500 feet was reached, with 22,500 linear feet of drifts, and 750 feet of shaft work. More extended descriptions of the mine and its geology will be found in the references noted under Bibliography.

Bibl.: R. VIII, p. 325; X, p. 270; XI, p. 64; XII, p. 361; XIII, p. 595; R of M., Lake County, p. 3; U. S. G. S. Mon. XIII, p. 375; Min. Res. 1888, p. 97; 1891, p. 117; 1892, p. 160; TRANS. A. I. M. E., XXII, p. 86.

Red Elephant. This prospect, owned by W. G. Tremper of Lower Lake, is in Sec. 3, T. 11 N., R. 5 W., near the Napa County line, ½ mile west of Knoxville. Only sufficient development, mostly surface work, has been done to cover annual assessments.

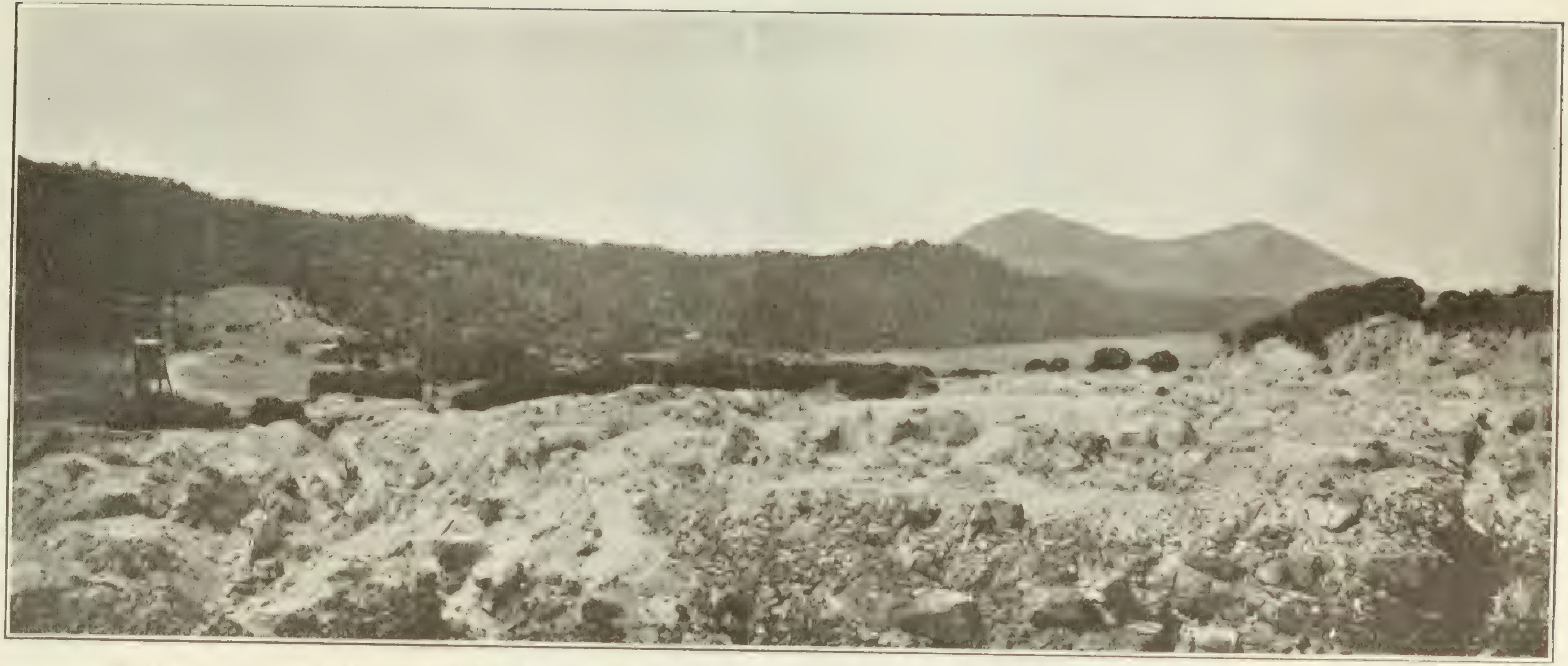
Bibl.: Bull, 27, p. 92; R. of M., Lake County, p. 3.

Shamrock Prospect. This group of two claims is on Rocky Creek, a branch of Cache Creek, in Sec. 23, T. 13 N., R. 6 W., about 10 miles northeast of Lower Lake. It is owned by the Shamrock Development Company (Jas. Daly, W. P. Swift et al.), Napa. The property is idle.

Bibl.: Bull. 27, p. 60; R. of M., Lake County, p. 3.

Standard (see *Mirabel*).

Sulphur Bank Mine. This mine is one of the notable and much written about quicksilver mines of the world. It is extremely interesting from many standpoints—those of chemistry, mineralogy and geology, as well as metallurgy and mining. It was first worked in 1865 for sulphur, and in the four years to and including 1868 produced a total of nearly 2,000,000 pounds of that mineral, valued at $53,500. The property was at that time owned by the California Borax Company which during the same period was also producing borax from Borax Lake, near-by. The two are still intact, being owned at present by W. S. Tevis, of San Francisco, and leased out as part of a cattle range. During the time of working the surface cuts for sulphur, some difficulty was experienced in refining the material because of the presence of cinnabar, which darkened the product. The proportion of cinnabar increased with depth. Cost of transportation to the market and a rapid fall in the price of sulphur caused a cessation of operations, but the mine was reopened and developed for its quicksilver in 1873, being a steady and important producer until 1883. After four years of idleness, work was resumed and continued until 1897, when it was again shut down. In 1899 the mine was reopened and worked until December, 1905, the shaft being kept unwatered until June, 1906, since which time it has been idle. As a producer of quicksilver, the Sulphur Bank mine is credited with a total output of 92,000 flasks. It is said that at the time of the last closing down of the mine (due to financial



Panoramic photo. Sulphur Bank Mine, Lake County, California, from eastern wall of old open cuts. Mt. Konocti in right distance.

troubles as well as the increasing difficulties of ventilation and pumping in consequence of the hot waters and deleterious gases) they had opened up a good body of high grade ore underground from the Empire shaft.

The Sulphur Bank is a low, rounded hill (see photo No. 22), on the eastern shore of Clear Lake in Sec. 6, T. 13 N., R. 7 W., about 10 miles north of Lower Lake. It is also reached by launch from Lakeport. The elevation is 1350 feet at the lake level. The old surface cuts much resemble those of a placer mine with its tailings piles of boulders, except that over it all is a pulverulent, white powdery material, the result of the continuing decomposition of the rocks by the solfataric vapors and waters still present (see panoramic photo). The glare is almost blinding on a sunny day. The rounded boulders due to concentric decomposition, as described by Becker (U. S. G. S. Mon. XIII) can be plainly seen. The evidences of solfataric activity are numerous and striking. Iron rails, nails, cables, etc., are sulphurized and oxidized Wood is blackened and rotted. There are abundant sulphur crystals in crevices and flour sulphur around vents where vapors are issuing. At the mouth of an abandoned shaft, now caved, near the eastern edge of the surface workings (either the Hermann shaft or Hermann air shaft—see map, Bull. 27, p. 63), hot, moist, sulphurous gases are still escaping, and under a noticeable pressure. The odor of sulphur dioxide is very strong, so that it was difficult to breathe while placing a thermometer in one of the openings to observe the temperature. It showed 108° F.—this being at the surface. Becker (op. cit., p. 259), recorded temperatures up to 176° F. at a depth of

Photo No. 22. Sulphur Bank Mine from lake side.

300 feet. The rocks about the opening and protruding sticks of timber are heavily coated with a deposit of flour sulphur. There is a sound as of a roaring furnace from below. How any one could breathe in such an atmosphere, much less work, is a matter for wonderment. There was a dead rat lying at one of the openings. At the upper end of the "Western Cut," there are a number of warm springs with considerable excess gas escaping with the water—the whole having the appearance of a series of boiling cauldrons. (Photo No. 25). The appearance is deceiving, however, as the temperatures are much lower than one would expect. The following temperatures were obtained: 84° F.; 108° (water inky, with a black deposit forming about it); 100°; 97° (in upper corner). The Empire shaft (the latest sunk), was filled with water to within 15 feet of the collar at the time of my visit (August, 1913), and escaping gases were bubbling up through the water. "The gases escaping from the waters are carbon dioxide, hydrogen sulphide, sulphur dioxide, and marsh gas. The waters contain chiefly carbonates, borates, and chlorides of sodium, potassium and ammonium; but alkaline sulphides are also present." (Becker, op. cit., p. 463.)

Photo No. 25. Hot springs in bottom of "Western Cut," Sulphur Bank Mine, Lake County, California.

As to the mode of occurrence of cinnabar at Sulphur Bank, it is well summarized by Becker (op. cit., p. 257), as follows: "It does not occur in sensible quantities at or near the surface, but is found to a considerable extent mixed with sulphur in the lower portion of the zone of oxidation. The principal deposits are below this level. They are found in the more or less decomposed basalt, in the underlying recent lake bottom, and in the Knoxville shales and sandstones. The cinnabar is associated chiefly with silica, in part crystalline and in part amorphous. In the lava it appears as small seams, which commonly follow either the original cracks between the blocks or the concentric surfaces of the decomposed masses. In the lake deposits below the basalt the cinnabar is found as impregnations or irregular seams. In the workings from the Hermann shaft the ore occurs exactly as it does in most of the quicksilver mines of California, more or less completely filling interstices in shattered rock masses. * * * Dr. Melville has found small quantities of gold and copper in the marcasite accompanying the cinnabar. * * * The intimate association of the ore with the sulphur, opal, quartz, pyrite, and to a smaller extent with calcite, is amply sufficient to show that it has been deposited from water." Also (p. 263): "Excepting for the solfataric springs the underground mine at Sulphur Bank resembles the other principal quicksilver mines of California. * * * This fact is an important one, for it proves that deposits indistinguishable from those found in the Redington, New Almaden, and other mines may be formed in the same manner as those at Sulphur Bank, by precipitation from hot springs of volcanic origin."

The property was equipped with a Knox-Osborne 25-ton furnace, 3 Hüttner-Scott furnaces of 40, 17 and 30 tons, respectively, and a battery of 9 "D" retorts.

At the "Little Sulphur Bank," above ½ mile south of Borax Lake, some prospecting has been done. Here, the same sulphurous odors are noticeable as at Sulphur Bank.

Bibl.: R. IV, pp. 157, 330, 339; V, p. 96; VI, Part I, p. 136; VIII, p. 324; X, pp. 238, 239; XI, p. 63; XII, p. 363; XIII, p. 597; Bull. 27, pp. 61–70; R. of M., Lake County, p. 3; U. S. G. S. Mon. XIII, p. 251–270, 463; Min. Res., 1883, pp. 394–397; 1884, p. 492; 1892, pp. 146, 148, 160; 1902, pp. 251, 252; Water Sup. Pap. 338, pp. 98–99; GEOL. SURV. OF CAL., GEOL., Vol. I, p. 99; TRANS. A. I. M. E., XXIII, pp. 225 *et seq.;* XXXIII, p. 751; Genesis of Ore Dep., pp. 32, 66, 256; MIN. RES., W. OF ROCKY MTS., 1868, p. 266; 1876, p. 20; AM. JOUR. OF SCI., Vol. XXIV, 3d Ser., pp. 23 *et seq.*

Thorn Mine (*Bear Canyon*). It is west of Middletown, in Sec. 36, T. 11 N., R. 8 W., near Anderson Springs. H. W. Herrick of Middletown is the owner. Only assessment work has been done for several years past, but it is said no ore bodies of any consequence have been developed. In 1909, a small production was reported from ore taken out during development work.

Bibl.: Bull. 27, p. 70; U. S. G. S. Min. Res. 1909, p. 552.

Uncle Sam Mine (see *Lucitta*).

Ural Mine (see *Chicago*).

Utopia Mine. The Utopia is on the eastern shore of Clear Lake in Sec. 25, T. 15 N., R. 9 W., near Bartlett Landing, northeast from Lakeport. It is owned by the Utopia Quicksilver Mining Company of Lakeport, A. Spurr, secretary. It has not been operated recently, as it is said they were driven out by water, the ore body running under the lake.

Bibl.: R. XIII, p. 597; Bull. 27, p. 70; R. of M., Lake County, p. 3.

Wall Street Mine. This mine was a producer as early as 1875, about which time it was patented, but abandoned by the original owners in 1878. The present owner, W. H. Parsons, acquired the property in 1898, by purchase of tax title from the state, and has been reporting an output of a few flasks of quicksilver annually for the past seven years. It is located in Sec. 1, T. 10 N., R. 8 W., on a branch of Dry Creek, 6 miles west of Middletown. The elevation is 2275 feet (bar.) on the road at the retort. The old workings are largely inaccessible. The owner works the mine single-handed, assisted by a pack-horse for handling ore, timbers and firewood. The Wall Street mine is about ½ mile down the canyon from the Helen from which it appears to have been broken by a northeast-southwest fault. Their main mineralized ledges have several characteristics in common and are marked by the same prominent outcrop. The Wall Street, however, has a considerable proportion of native quicksilver which does not appear at the other. There is a narrow quartz vein in the main ledge near its hanging-wall side, and parallel to its dip—30° SW. The vein, which has a comb structure, carries in its numerous cavities and pores much native metal. Parsons states that the serpentine from 1 to 3 feet above and below the quartz carries some 4% of both native metal and cinnabar in about equal proportions. The silicified ore-bearing serpentine lies above the softer serpentine and carries the quartz vein, cinnabar, pyrite, and lenses of jasperoid. In the mill there is a 20 h.p. Westinghouse compressor (being a locomotive air-brake pump, 9½-inch diameter by 10-inch stroke), steam driven, which furnishes power for an air hammer drill in underground work. There is also a small Chilian mill, and two homemade, table concentrators, said to have a capacity of

3½ tons per day. Some of the soft ore is concentrated, but the jasperoid and disseminated ores are retorted direct. One "D" retort is used—14 inches high, 30 inches wide and 8 feet long—which consumes 1½ cords of firewood per flask of quicksilver produced. This retort has a capacity of 600 pounds of ore per day. The old company is said to have expended $100,000 and produced 140 flasks. The total output to the end of 1913 has been about 300 flasks.

Bibl.: R. IV, p. 183; V, p. 96; VI, Pt. I, p. 110; XII, p. 362; XIII, p. 597; Bull. 27, p. 71; R. of M. Lake County, p. 3; U. S. G. S. Mon. XIII, p. 375; Min. Res. 1907, Part I, p. 679; 1908, Part I, p. 686; 1909, Part I, p. 552; 1910, Part I, p. 698; 1911, Part I, p. 901; 1912, Part I, pp. 940–942.

STONE INDUSTRY.

Except for occasional local uses, there has been no development of the stone industry in Lake County. The board of supervisors reported macadam to a value of $10,000 used on road work in 1908, but they have done nothing but minor repairs since that time. There is said to be a red volcanic rock near Lower Lake which makes an excellent macadam, particularly when mixed with some clay.

SULPHUR.

Sulphur Bank Mine. As has already been noted (see under *Quicksilver*), the Sulphur Bank mine was originally operated for sulphur, of which it produced some 2,000,000 pounds (in round numbers), valued at $53,500, in the four years 1865–1868, inclusive. In the upper portions of the oxidized zone sulphur was abundant, and the material was taken out by quarrying. The sulphur was extracted by sublimation in cast iron retorts, then further refined by treating, while melted, in iron kettles to remove the dark color due to the presence of cinnabar, and finally poured into moulds. Cost of transportation and the decreasing market price caused a cessation of mining for sulphur. There is still much of this material in evidence at the Sulphur Bank, today, but it is doubtful if it can be made economically available, in competition with the Louisiana product and that from Japan (which latter is practically pure in its natural state, and requires no refining for most commercial uses), at least not until cheap transportation is established. The same statement applies to the borax deposits of Borax Lake on the same property.

Bibl.: R. IV, p. 379; V, p. 96; VI, Part I, p. 136; VIII, p. 324; X, pp. 238, 239; XI, p. 63; XII, p. 410; XIII, p. 646; Bull. 38, p. 372; U. S. G. S. Mon. XIII, pp. 254, 463; GEOL. SURV. OF CAL., GEOLOGY, Vol. I, p. 99; MIN. RES. W. OF ROCKY MTS. 1867, p. 187; 1868, p. 266; 1872, pp. 447–450.

MARIN COUNTY.

Field Work in November, 1913.

Exclusive of San Francisco County, Marin is the smallest county in California, having a land area of only 529 square miles. The Pacific Ocean is its western boundary, Sonoma County on the north and east, San Pablo and San Francisco bays on the east, with the latter and the Golden Gate on the south. Its topography is quite rugged and picturesque, with occasional small and fertile valleys. Its most prominent topographic feature is Mount Tamalpais which overlooks both bay and ocean region from an elevation of 2600 feet. Other notable features are Tomales, Drakes, Bodega and Bolinas bays, on the ocean side, and Richardson's Bay on the inland side. Angel and Belvedere islands are included in Marin County. The areas around San Rafael, Mill Valley, Sausalito, and intermediate points are popular suburban residence sections.

The mineral resources of Marin County, while limited numerically, are none the less important individually. They are mainly structural and industrial materials. In the order of their production to date (see table) they are: brick, stone industry, mineral water, granite, salt, and copper. Their total recorded output is $3,869,799 to the end of 1913.

In addition to the above, occurrences have been noted of asphaltum and petroleum, chrome, coal, jasper, garnets, manganese, and natural gas. Attempts have been made to exploit some of these, but without commercial success so far.

ASPHALTUM AND PETROLEUM.

Along the shore-line cliffs west of Bolinas from Duxbury Point north for a distance of over 3 miles there are several small occurrences of asphaltum which appear to be residues from oil seepages. The principal ones are at Duxbury Point, Bolinas Point and Abalone Beach. Specimens of the material were collected and have been placed in the museum of the State Mining Bureau. There are pebbles and rock fragments imbedded in the asphaltum (see photo No. 165).

At Abalone Beach there is said to be an oil seepage which is uncovered at extreme low tide, but the tide was not low enough to see it during my visit. The shales here dip to the south and east at a rather flat angle (20° to 30°). At the south end of this beach, and about 1¼ miles north of Bolinas Point, is an unconformity between two series of shales, the upper series being more massive than the other. The top of the lower series is marked by a thin layer of pebbles partially stuck together with asphaltum.

Table of Mineral Production.

Year	Brick		Stone industry		Mineral water		Miscellaneous and unapportioned	Value
	1,000	Value	Tons	Value	Gallons	Value		
1888	1,600	$10,000						
1889	*2,000	12,000						
1890	*5,000	30,000						
1891	*10,000	60,000						
1892	*12,000	72,000						
1893	18,000	108,000						
1894	28,500	172,500		$16,850				
1895	29,000	145,000		7,790			7,000 cubic feet granite	$5,000
1896	15,000	85,000	7,849	8,260				
1897	15,000	89,000	6,000	7,200				
1898	15,500	66,000	1,710	1,800				
1899	16,500	76,000	4,400	5,150				
1900	25,000	200,000	3,000	2,500				
1901	14,320	100,240	34,000	27,987				
1902	14,600	97,700	149,450	105,350			700 tons salt	1,400
1903	13,819	78,095	144,715	140,332				
1904	20,500	132,000	216,576	170,995				
1905	22,877	163,585	113,000	44,250				
1906	23,900	199,300	54,000	53,000			150 tons salt	300
1907	16,000	118,000	157,100	134,111				
1908	10,000	50,000	111,686	66,700	52,000	$12,050		
1909	4,500	105,000	132,010	67,010	47,500	5,075		
1910	22,497	99,185	112,000	74,700	100,000	10,000		
1911	19,695	87,445	173,646	108,786	328,740	36,500		
1912	18,000	88,200	5,300	3,000	260,000	31,000		
1913	16,000	70,500	428,357	198,953	60,000	9,000		
Totals	409,808	$2,514,750	1,854,799	$1,244,724	848,240	$103,625		$6,700

*Estimated.

Totals.

Brick	$2,514,750
Stone industry	1,244,724
Mineral water	103,625
Miscellaneous	6,700
Total to end of 1913	$3,869,799

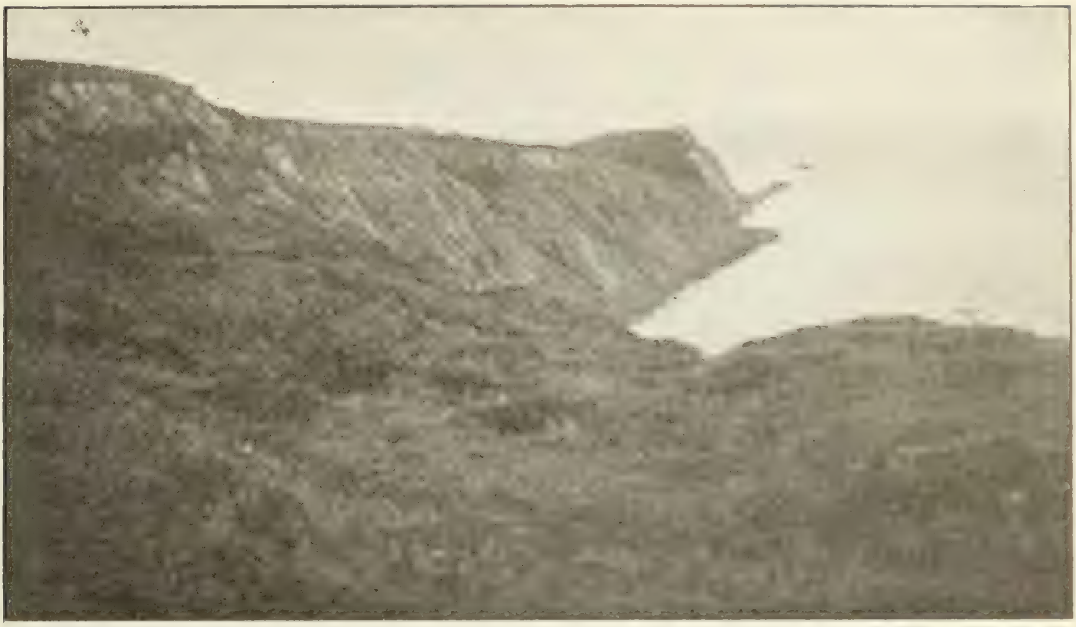


Photo No. 172. Duxbury Point and Reef, Marin County, California, looking southeast. Dip of shale beds is to west (right).

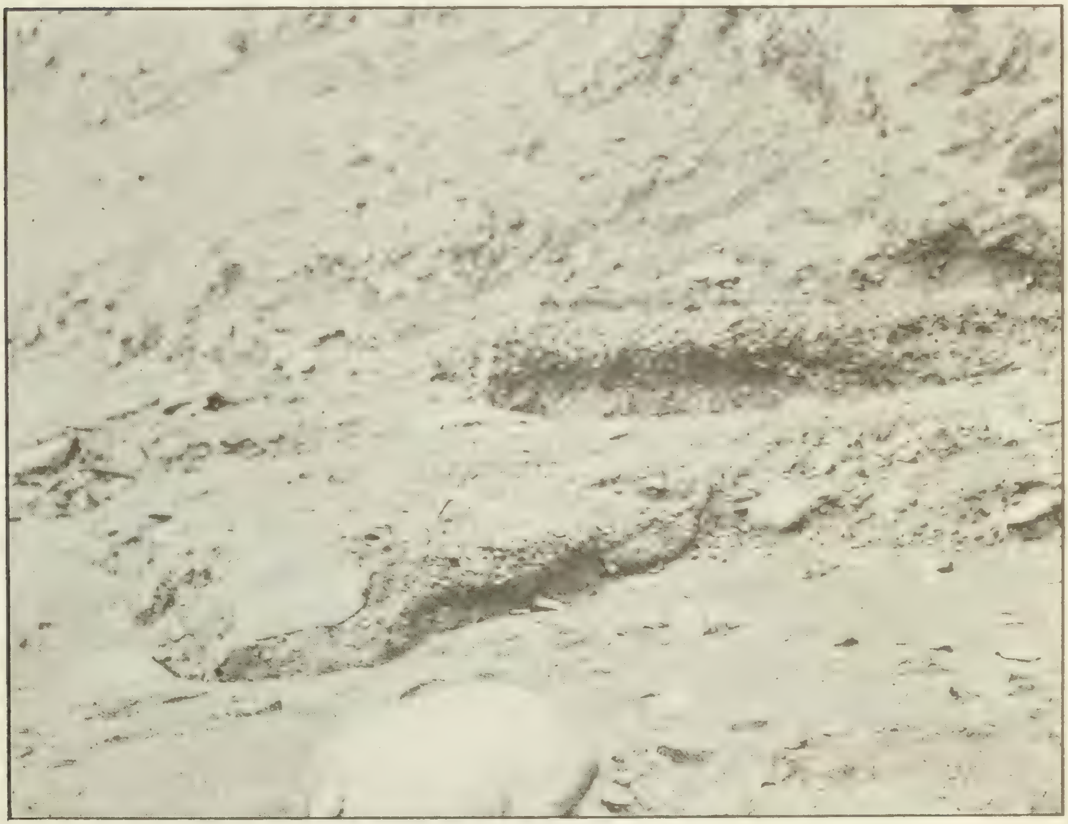


Photo No. 165. Asphaltic residue from oil seepage, at base of sea-cliff, northwest from Bolinas, Marin County, California.

From Bolinas Point to Duxbury Point the shale strata, which are somewhat indurated, strike southeast and dip to the west at an angle of 45° to 50°. At the latter place the beds are massive and continue for some distance into the sea, forming the well-known and dangerous Duxbury Reef (see photo No. 172). In the cliffs at this point the asphaltum appears in thin seams cutting across and nearly normal to the dip of the strata. There are small dabs of asphaltum sticking on the washed reef throughout this section from Duxbury Point to Abalone Beach. On first thought these "dabs" might appear to be artificial (i. e. sea-drift washed from passing vessels), but observation showed them to occur only in the vicinity of the oil seepages.

At Bolinas, about $\frac{1}{3}$ of a mile west of the entrance to the Lagoon, the division between the soft, yellow sandstone to the east and the shale to the west is marked by a vertical fault plane. The dip of the sandstone is east, 10° to 15°. In this sandstone at a few feet above the beach level is a stratum of shells, 6 to 8 inches thick, distinctly marking the bedding planes.

On the mesa back of Duxbury Point (apparently an old sea terrace) two wells were drilled for oil about 1902. It is said that in the second well, which was a few yards from the sea cliff, a small flow of oil was obtained and several drumsful pumped out; that a charge of dynamite was exploded in the well to open up the flow more but that it became choked off entirely instead. Others state that the oil in the well was some of that hauled out there for fuel for the boilers.

Bibl.: R. XI, p. 249; XIII, p. 36.

BRICK AND CLAY.

At the *Bothing Home,* near Fairfax, pottery is being made on a small scale by the inmates, from clay obtained nearby.

Kaolin has been found near Duncan Mills. R. V, p. 108.

McNear Brick Company (formerly Fortin Brick Company). J. A. McNear, president, E. B. McNear, manager and superintendent. This plant is on tidewater at McNear's Point, 4 miles east of San Rafael. There is no railroad accommodation nearer than San Rafael, but the product is shipped by barges to the various bay points (see photo No. 131). Bricks were first made here about 30 years ago, and the fires in the present plant have not been out in the past 14 years. The property is part of the Spanish grant, "Rancho Santa Margarita y Las Gallinas."

The clay and shale beds which are on the northwest face of the hill are underlaid by Franciscan metamorphic sandstone. In the quarry, blasting is done by battery, and the material is loaded into cars by a small Bucyrus steam shovel (Class 14-B—on turntable like a locomotive crane). The cars are horsedrawn in trains to the storage bins.

From there the clay goes through the crushers, elevators and screens to the pug-mill. The "dry-pan process" is used. The dampened clay is mixed in the pug-mill and discharged into an auger, stiff-mud machine. From this it is forced in a slow-moving continuous stream, rectangular in cross-section and cut into proper lengths by a wire brick-cutting machine. The belt conveyor leading from the cutter travels slightly faster than the clay stream and so separates the blocks after they are cut. From there the "green" bricks are taken to the drying sheds (see photo No. 128).

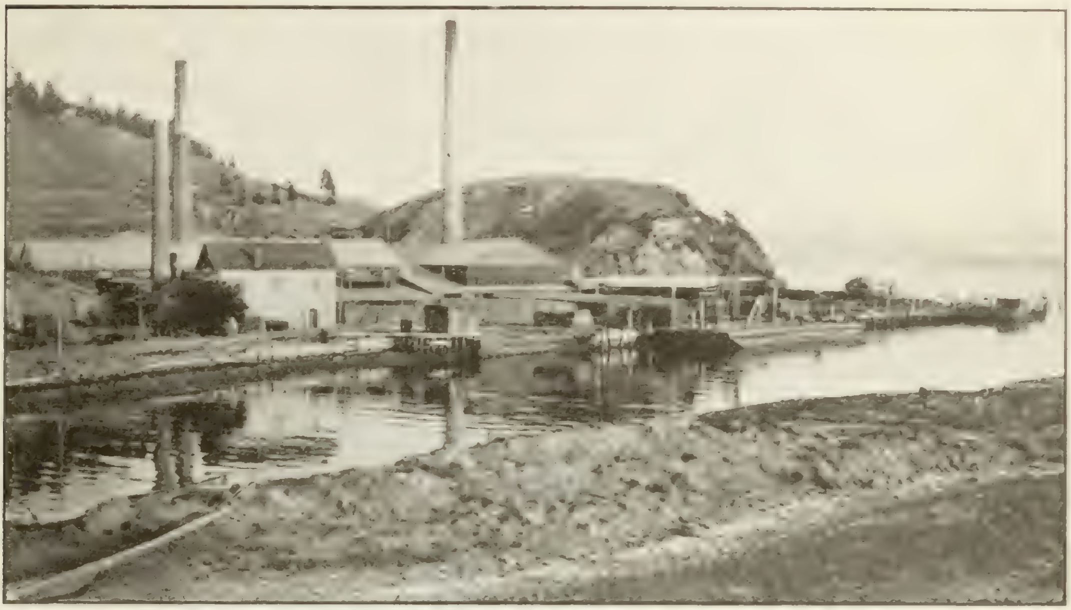


Photo No. 131. Plant and furnaces of the McNear Brick Company, near San Rafael, Marin County, California.

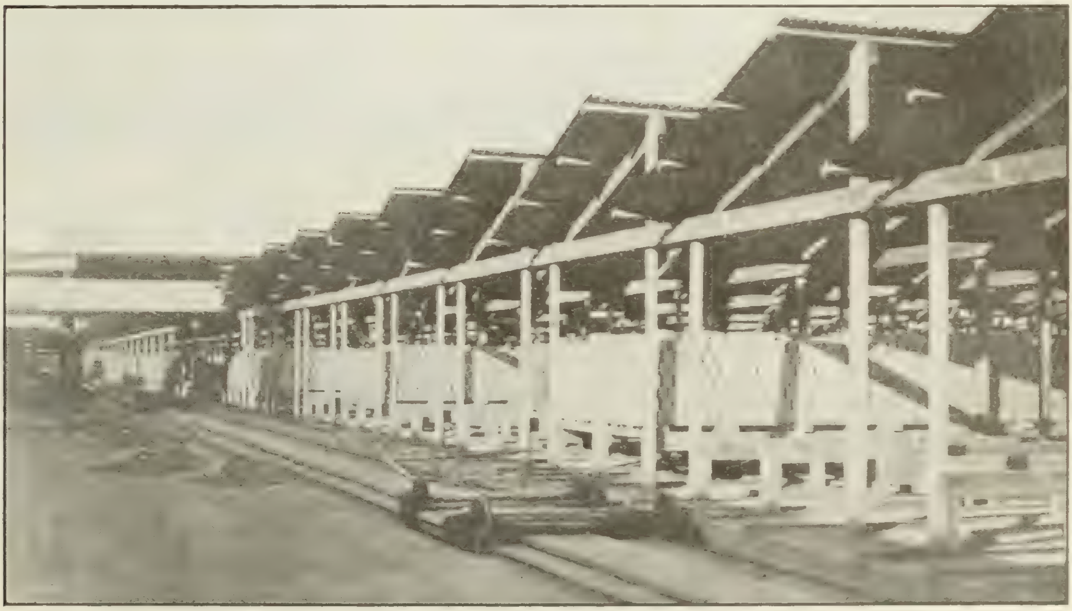


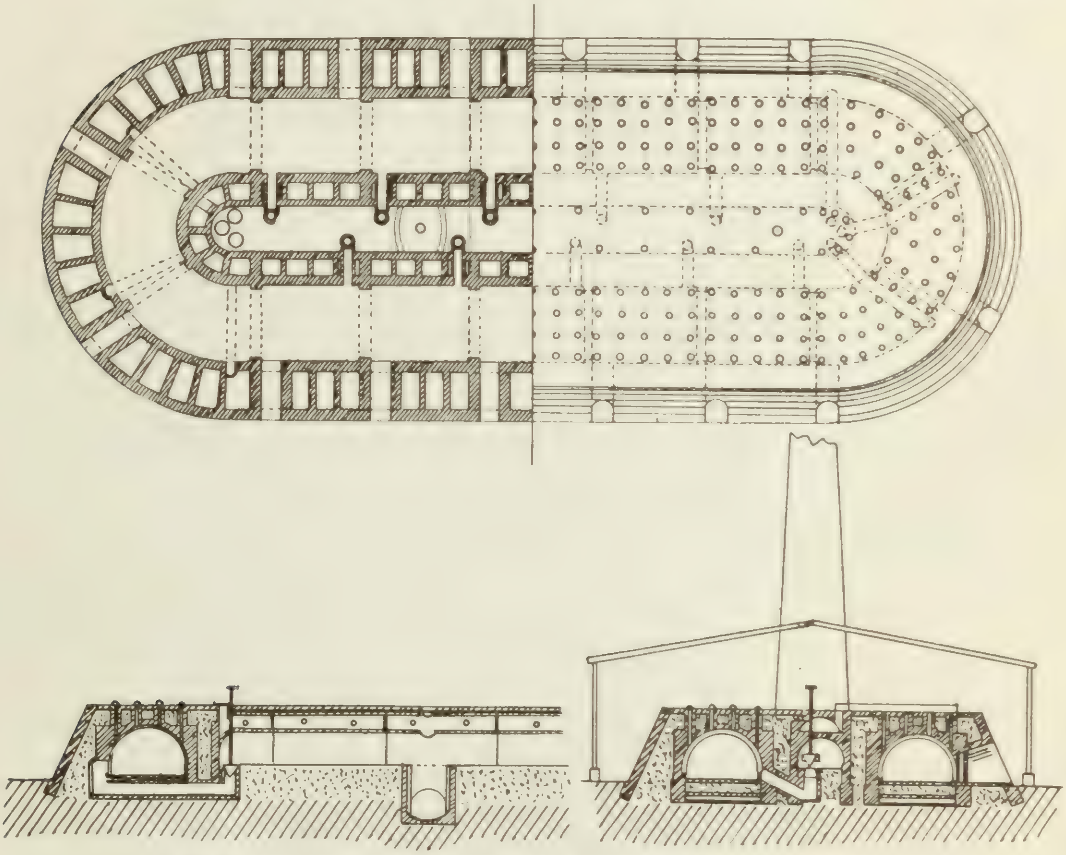
Photo No. 128. Drying sheds, McNear Brick Company, Marin County, California.

The brick forming end of the plant has a capacity considerably in excess of that of the furnaces. The excess is stored in the drying sheds during the summer months for burning in the winter when outside work is curtailed on account of the weather. The yearly capacity of the plant is 20,000,000 bricks. About ninety men are employed. There are two Hoffmann continuous kilns, coal fired (see photo No. 126 and drawing). The draft is from the top of the furnace down through the charge of bricks to the under-floor flues that carry it to the stack.

Photo No. 126. Top of Hoffmann brick kiln, McNear Brick Company, near San Rafael, Marin County, California.

The Hoffmann kiln consists of an arched, tunnel-shaped, firing chamber, either circular or oval in plan, or of two parallel tunnels joined by circular ends. The furnaces at the McNear plant are of the last-named type. This produces an endless kiln capable of being subdivided into a series of chambers of nearly equal size by means of cross partitions of a temporary character. From each chamber three flues lead respectively to: the central stack; the chamber preceding it in the series; and the chamber following it. Each of these flues may be closed at will by the insertion of a partition of sheet iron. Each compartment also has a doorway connected with the outside for charging and discharging. Slack or other fine coal is fed in at the top of the chambers (see photo No. 126) and one chamber is fired. Some plants use crude oil. The flues leading to the stack are closed except that from the newest chamber charged, behind the one fired. The interchamber flues are left open except the one between the fired chamber and that behind it in the series. By this arrangement the hot gases from the fired chamber pass successively through the other charged chambers, finally passing out from the last one to the central stack. When the bricks in the fired chamber are sufficiently burned, it is allowed to cool by closing its flues, and the next chamber ahead is fired. After removing the burned bricks the compartment is recharged and its flues opened *to* the stack and *from* the chamber behind it.

Bibl.: R. VIII, p. 342; XII, p. 382; XIII, p. 615; Bull. 38, p. 249.



Hoffmann continuous brick kiln. Plan and vertical sections.

There is clay on the *Mailliard Ranch,* on Spring Creek near Lagunitas Station, about 8 miles northwest from San Rafael. The Lagunitas Development Company, 202 Commercial Building, San Francisco, is owner. Occurrences of chromite and manganese are also reported on the same property.

Bibl.: R. XI, p. 253; XII, pp. 329, 382; XIII, p. 506; Bull. 38, p. 362.

Patent Brick Company. Home office, 1218 Merchants' Exchange Building, San Francisco. The plant is at Gallinas Station on the Northwestern Pacific Railroad, 4 miles east of north from San Rafael. It is also on a tidal canal for barges via Gallinas Creek. The present company began operations here about 1870; but the plant has been idle the past five years on account of low prices and small demand. The increasing use of concrete has cut heavily into the demand for bricks. The company still has some stock on hand which is being disposed of inland at rail connections. It is intended to resume operations whenever prices and conditions improve.

The plant has a capacity of 1,500,000 per month, and uses the dry-pan process. There is also a pressed brick department. The equipment includes: three dry-pan grinders, pug-mill, brick machine, cutters, press, drying kilns, two Hoffmann continuous kilns (coal fired), one circular kiln (oil fired) for pressed, Roman and fancy brick. A third furnace, now old and abandoned, is said to have been the first Hoffmann brick kiln built in America. The clay deposits are on the hillsides back of the plant.

Bibl.: R. XII, p. 382; XIII, p. 615; Bull. 38, p. 250.

Remillard Brick Company. This company for many years operated a plant at Greenbrae, 2 miles south of San Rafael, but it has now been idle for some time and the machinery disposed of.

Bibl: R. VIII, p. 342; XII, p. 382; XIII, p. 615; Bull. 38, p. 250.

CHROME.

(See Mailliard Ranch, under Brick and Clay.)

COAL.

(See Escalle under Stone Industry.)

There is a specimen of lignite in the museum of the State Mining Bureau from the Overton Ranch, on Tomales Bay.

COPPER.

In 1863 two or three companies did some work on a series of copper prospects about a mile east of Woodville (then Dogtown), north of Bolinas, and a small tonnage of sorted ore was shipped for treatment.

The Bolinas Copper Mining Company, T. P. H. Whitelaw, manager, in 1900 shipped some copper ore from the same locality, but nothing has been done since.

Bibl: R. V., p. 98; XI, p. 253; XIII, p. 59; Bull. 20, p. 14; Bull. 50, p. 168.

GRANITE.

There is a specimen of granite in the museum of the State Mining Bureau from Porter's Point, and the records show a production of 7000 cubic feet valued at $5,000 reported in 1895.

Bibl.: Bull. 8; Bull. 38, p. 364.

GRAPHITE.

Graphite has been reported from Marin County, but the locality is not definitely known.

Bibl.: R. IV, p. 224.

JEWELERS' MATERIALS.

Garnets in mica schist are found near California City on the Tiburon Peninsula and on the Reed Ranch.

So-called *moonstones* (principally translucent quartz) are found as pebbles along the ocean beach, particularly near Bolinas Point.

Jasper is found quite plentifully in Marin County in connection with the Franciscan cherts. Dr. S. M. Augustine of San Rafael has a large and beautiful collection of polished specimens of red and yellow jasper and banded chalcedony from around San Rafael, Sausalito, and other parts of Marin County. It makes beautiful jewelry but is too expensive to collect and prepare. It is highly siliceous and very hard, but is not obtainable in large enough pieces for building decoration. There is an infinite variety of coloring and figures.

Bibl.: Bull. 37, pp. 52, 78; Bull. 38, p. 366.

MANGANESE.

(See Mailliard Ranch under Brick and Clay). Manganese has also been found near Tomales and Sausalito.

Bibl.: R. IV, p. 316; Bull. 38, p. 368.

MINERAL WATER.

Ancha Vista Spring. J. Richards, Sausalito, owner. Dave Davis, lessee. The spring is on the slope of Red Hill at San Anselmo, elevation 150 feet (U. S. G. S.). It has been known for over thirty years but utilized medically only the last few years. It is in sandstone. Analysis said to be by the Medical Department, University of California, shows 21 grains per gallon, principally magnesia and lithia. The flow is ordinarily about 100 gallons per day and a portion of the output is shipped in 5-gallon carboys. The hotel and cottages are on the adjoining property owned by Mr. Davis.

El Toro Spring is on the Taylor ranch near Novato. It is not utilized at present.

Bibl.: R. XI, p. 251; XIII, p. 512; U. S. G. S., Water Sup. Pap. 338, p. 255.

Rocky Point Hot Sulphur Springs are on the beach at Rocky Point, 8 miles southeast of Bolinas. They are not utilized except locally.

Bibl.: R. XI, p. 250; XIII, p. 512; U. S. G. S., Water Sup. Pap. 338, p. 80.

Sausalito Spring Water Company., Sausalito. This is plain water, not mineral.

Tamalpais Mineral Water Spring. Borello Bros., owner. This is a drilled well at First and Hayes streets, San Rafael, elevation 50 feet (U. S. G. S.). The well was sunk in 1903, and the water analyzed in December, 1904, followed immediately by bottling operations. It is 26 feet deep, not artesian, and has no contained gas. It is bottled, carbonated, and is also used in the manufacture of soda water and other flavored, soft drinks. Temperature 60° F. A 3 h.p. electric motor runs the pump and bottling machines.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 307.

NATURAL GAS.

An inflammable gas escapes from the reef at Duxbury Point, near Bolinas. It can be observed only at extreme low tide. It is stated that natural gas has also been found near Nicasio.

Bibl.: R. VII, p. 184; XIII, p. 567.

PETROLEUM.

(See under Asphaltum).

SALT.

Salt was first made from the bay water by evaporation at San Rafael in 1867. More recently the Golden Gate Salt Company reported an output for a time but there has been no plant in operation since 1909.

Bibl.: Bull. 24, p. 106.

STONE INDUSTRY.

Angel Island Quarry (see Fort McDowell).

Daniel Contracting Company (Bull Quarry, also McNear). Home office, 503 Market street, San Francisco. John H. Hopps, consulting

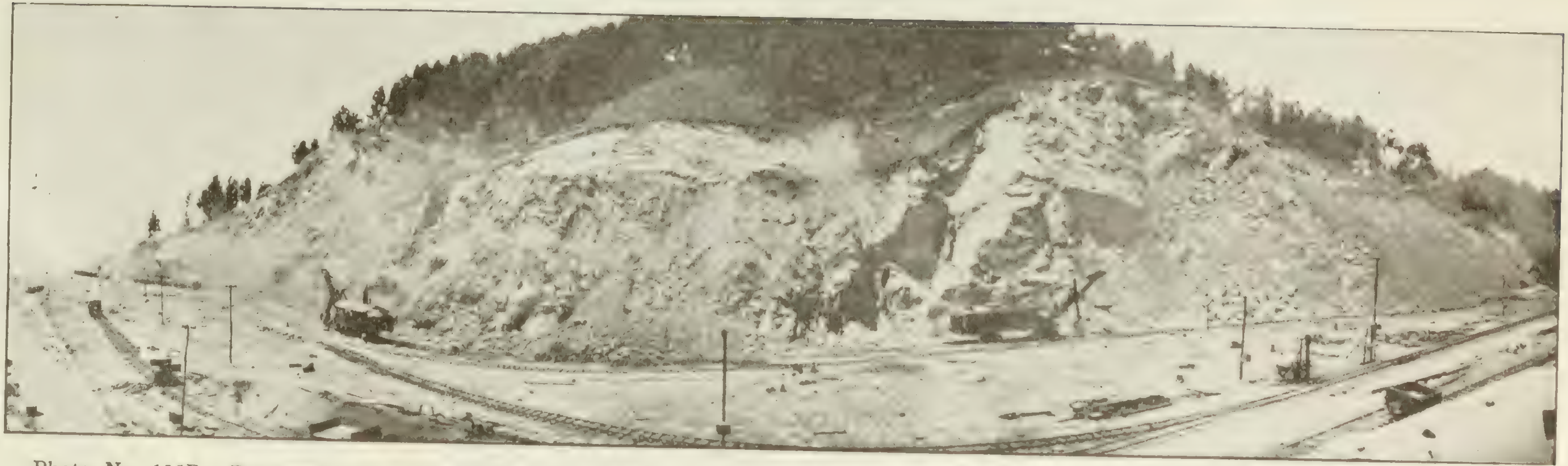


Photo No. 125B. Panoramic view of Daniel Contracting Company's quarry at San Pedro Point, six miles east of San Rafael, Marin County, California. Face 1200 feet wide.

engineer. This company is operating under lease one of the quarries on land owned by the McNear Company, Inc., at Point San Pedro, 6 miles east of San Rafael. It was known as the Bull quarry at one time, and for several years was operated by Wetmore Bros. The present operators have contracts aggregating approximately 1,000,000 tons of rubble—600,000 tons to the "Key Route" mole, Emeryville, and 400,000 tons to the San Francisco seawall. They have opened up a quarry face of 1200 feet in width (see photo No. 125B), and are shipping (June, 1914) an average of 2500 tons per day.

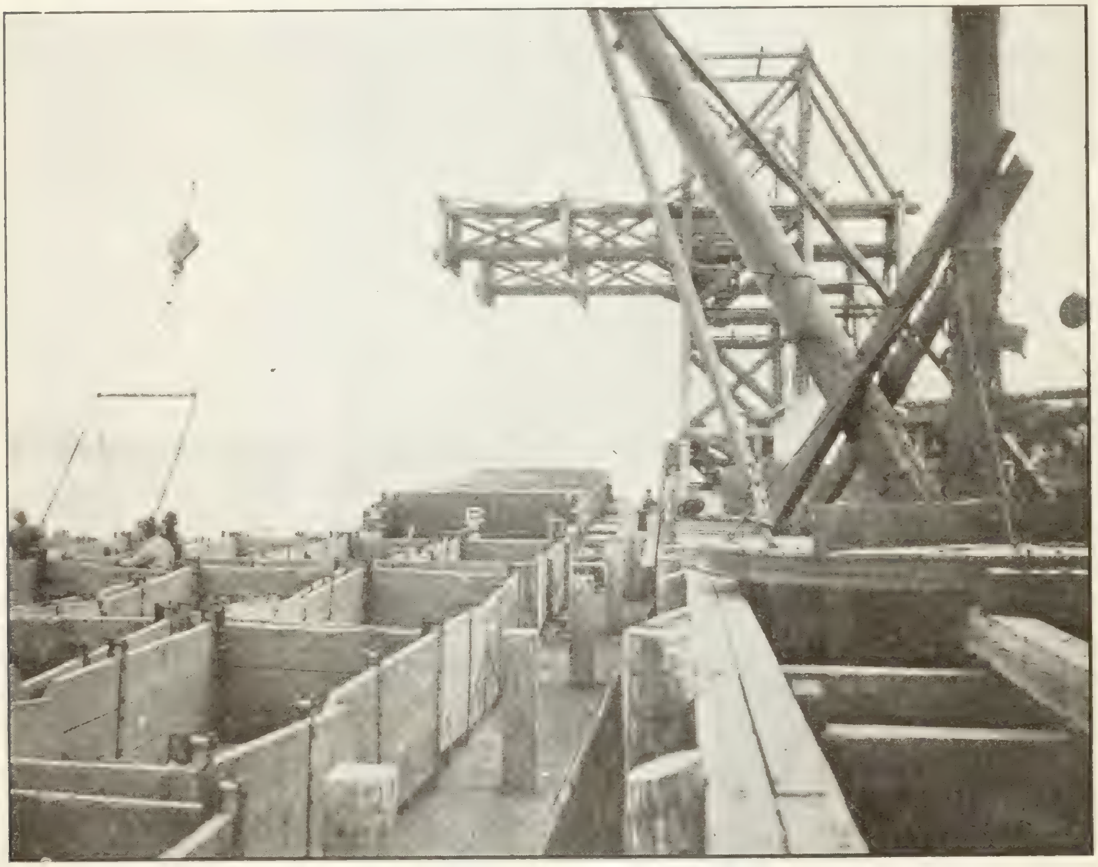


Photo No. 114. Daniel Contracting Company's loading pier and barges at San Pedro Point, Marin County, California.

In advance of the quarry face the thin skin of surface dirt was hydraulicked off. Machine drills are used and occasionally a short tunnel is driven into the face about 25 feet, branching right and left at the end. The tunnel is charged with 5 to 10 tons of dynamite, wired in duplicate, and exploded with a 220-volt current. The rock is mostly a hard, bluish, Franciscan metamorphic sandstone, though in part it is yellowish brown where oxidized. The formation is massive and more or less fractured. Pieces up to 3 or 4 feet across are shipped —as large as can be handled conveniently by the steam shovel. There is a small amount of clay on some of the fractures, and there is clay and shale at the north end of the sandstone. The material is loaded by the steam shovels into side-tipping dump cars and run out onto the loading pier (see photos Nos. 114 and 115) in trains by small steam locomotives. There it is dumped onto a grizzly with 2½-inch openings. The coarse drops into a skip with bottom discharge in which it is transferred to the barges alongside by an overhead traveling electric crane of seven tons capacity. The fines are elevated by two belt conveyors (each driven by a 15-h.p. motor) to the waste bin from which they are hauled and dumped along the shore. The company has in service twelve "skip" barges (see foreground of photo No. 114), two deck barges (for large single stones), two bottom dump (note barge "B" in background of photo No. 114) and two side-dump barges. The first named hold 40 to 50 skips of four cubic yards capacity each—a barge capacity of 200 to 300 tons. The bottom dump barges carry 900 tons each, and the side dumps about 700 tons. These last two classes are used for subaqueous dumping, and the skips when the fill has reached above the level of the water or for fills ashore.

Photo No. 115. Daniel Contracting Company's pier and quarry at San Pedro Point, Marin County, California.

The equipment, which has a rated capacity to ship 4000 tons per two ten-hour shifts, besides that already noted, includes: three steam shovels (with two cubic yard buckets); eight "dinky" locomotives (six in service); air compressor, 150 h.p., electric driven. Crude oil fuel is used. Seventy-five to 90 men are employed. There is also a crushing and screening plant of 250 cubic yards per day (ten hours) capacity, which is operated only intermittently.

Bibl.: Bull. 38, p. 318.

Dodge & Croker (see Short Ranch).

Escalle Quarry. Jean Escalle, owner. This is a small quarry in a ravine at Escalle Station. The rock is a blue metamorphic sandstone, broken up by streaks of black slickensided serpentine. There is also a small broken vein of coal—a shaly lignite. There is considerable overburden of soil and oxidized rock. The county at one time had a portable crushing plant here getting out road material.

Forbes Quarry. Miss Kate Forbes, San Rafael, owner. This red chert quarry is in a hill at the north edge of town and has been utilized for street and concrete work. The material is much foliated and breaks up small without requiring a crushing plant. There is also some sandstone and shale interbedded. Idle in 1913.

Bibl.: R. XII, p. 389; XIII, p. 625; Bull. 38, p. 318.

Fort Baker Quarry. U. S. Government, owner. Palmer, McBride & Quayle of San Francisco have a contract to deliver to the Exposition grounds in San Francisco 75,000 cubic yards or more (but not to exceed 120,000 cubic yards) for road building. They are equipped to handle 1500 tons per day at the quarry, but the unloading facilities at the Exposition can as yet take care of only 500 tons. A steam shovel, oil burning, is used and two small locomotives with dump car trains. The barges carry 250 to 300 cubic yards and a locomotive crane with clamshell bucket unloads them. Twenty-three men were employed (November, 1913).

The rock is taken from the hill back of the guardhouse and the barracks. It is a much altered and fractured Franciscan metamorphic sandstone, dark greenish and brown in color and fine grained. Back of the hospital there is a small quarry in red chert, which is used occasionally for road repairs around the reservation.

Fort Barry (see Point Bonita quarry).

Fort McDowell Quarry (formerly called Angel Island quarry). U. S. Government, owner; under supervision of the constructing quartermaster, U. S. Army, Fort McDowell. As the earlier name implies, this quarry is on Angel Island. It is on a rocky point on the east side of the island and was first opened up about 1890 by the engineering corps. The old crushing plant, steam driven, had a capacity of 40 tons per day. This has been displaced in 1913 by a new plant using electric power and having a capacity of 40 tons per hour. The new bunkers, with a storage capacity of 800 tons, load direct to barges.

Electric power is brought to the island by submarine cable from Sausalito. The equipment includes a No. 5 Symons gyratory crusher, bucket elevator, and a trommel. Three sizes of product are made: screenings, $\frac{3}{4}$-inch and $1\frac{1}{2}$-inch. The new plant cost $15,000, but it is estimated that it will save the government $60,000.

The rock is a blue-gray metamorphic sandstone in massive beds, with some partly oxidized material at the surface. Up to October, 1913, a total of 45,000 cubic yards of clean rock and 40,000 cubic yards of oxidized have been produced, the latter being used on roads and fills. It is estimated that there are 150,000 cubic yards yet available for quarrying, of which 70,000 cubic yards will be used for road work.

This quarry has furnished rock for concrete and other construction at several of the Bay posts, including Fort Mason, the Presidio and Alcatraz Island. With sand also obtained on the island this rock was employed in constructing the new buildings of the enlarged recruit depot of Fort McDowell, just above the quarry. These reenforced concrete structures represent an expenditure of $600,000 for materials alone, as the labor, except skilled civilian foremen, was furnished entirely by military prisoners. There is a barracks building and a mess hall with a normal capacity for 2000 men each. The upper floor of the mess hall is a drill hall. There is also a guardhouse, hospital, post exchange, administration building, and quarters for both commissioned and non-commissioned staff, all of concrete.

Gray Bros. (see San Francisco Quarries Company).

Hoffman Quarry. B. H. Hoffman, owner. This is a small quarry 3 miles north of San Rafael, on the Petaluma road, which is used occasionally for road work nearby. Idle in 1913.

Bibl.: Bull. 38, p. 319.

Hotaling Quarry. Hotaling Estate Company, owners, Merchants' Exchange Building, San Francisco. Steffini-Bartini Company at one time worked it under lease. It is at the south end of Clark street, San Rafael, and is operated intermittently on a royalty basis of $1 per load (about 2 cubic yards). The rock, which is a blue metamorphic sandstone, is used for curbings and rubble walls. The Presbyterian Church in San Rafael is built with rubble from this quarry. Production to date has been about 10,000 cubic yards. There is no plant.

Bibl.: R. XII, p. 389; XIII, p. 625; Bull. 38, p. 319.

Jordan Quarry (see San Francisco Quarries Company).

Marin Rock Company. S. Brizzolara, president, 119 Jackson street, San Francisco; C. A. Macomber, superintendent, San Anselmo. This quarry is on the west edge of San Anselmo, at an elevation of 100 feet (U. S. G. S.). Work began in 1909. The rock is a metamorphic sandstone, in parts serpentinized. There are also streaks of a soft black clay gouge, slickensided. The hardest and cleanest of the rock is used for rubble. A derrick raises the rock in skips to the crusher. A 30 h.p. motor runs the compressor, and a $7\frac{1}{2}$ h.p. the hoist. There are two other motors for the crushing and screening machinery, 10 and 5 h.p. A gasoline engine was formerly used. The coarser breaking is done with a jaw crusher, and the finer by a Gates "D" gyratory. The revolving screens make four sizes of product. The company also has a Springfield traction road roller for street work. Twelve or fifteen men are required when in full operation (50 tons per day capacity). The waste is used for fills about town.

McNear Quarries (see Daniel Contracting Company and San Francisco Quarries Company).

J. Martin Miller has 5 acres near Schuetzen Park Station, containing rock suitable for road work. Only small amounts have been used so far as there is no regular quarry opened up.

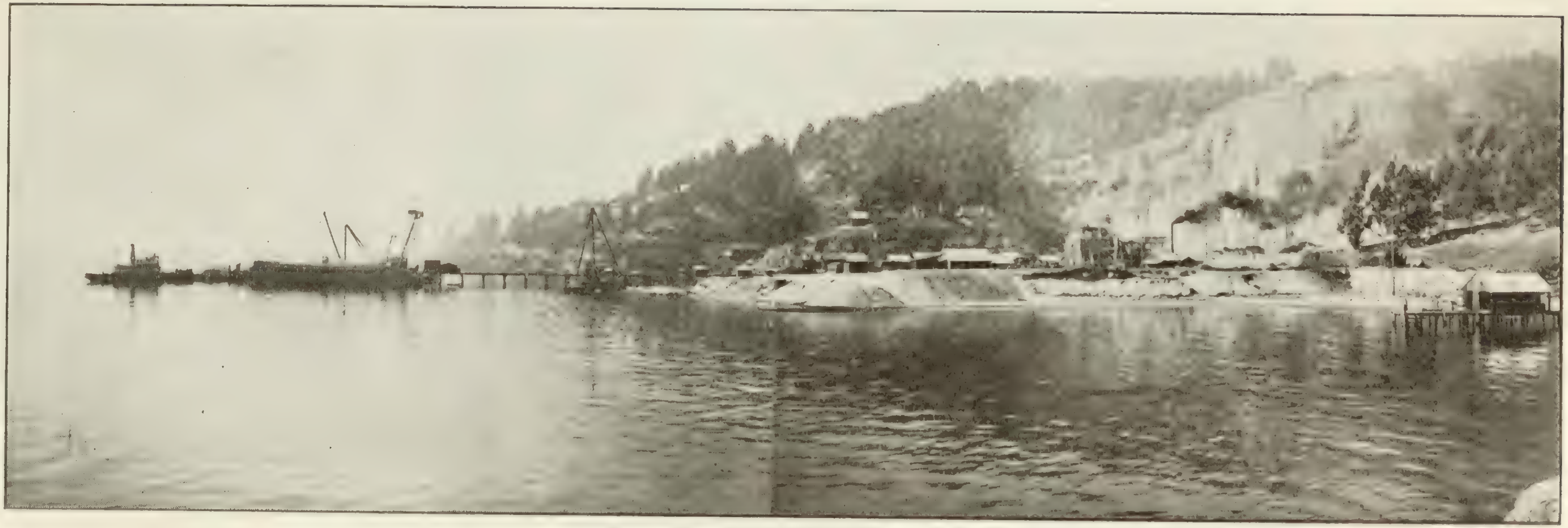
The Mount Tamalpais Cemetery Quarry is in the cemetery northeast of San Rafael. The rock is metamorphic sandstone and has been employed for curbings and other uses about the grounds. It is worked only intermittently.

Bibl.: R. XII, p. 389; Bull. 38, p. 319.

Northwestern Pacific Railroad Company. General offices, Phelan Building, San Francisco. In extending and regrading its ferry and train terminal at Sausalito this company is completing (May, 1914) a fill of 50,000 cubic yards. The rock has been taken from land owned by the Roys Estate at Roys, above Manor Station. It is mostly a blue metamorphic sandstone, with some oxidized material. The company also has quarries at Black Point, Tiburon Point, and at Waldo, used intermittently for ballast and fills. The material from these cuts is decomposed and much fractured.

Bibl.: Bull. 38, p. 319.

Point Bonita Quarry (Fort Barry). U. S. Government, owner, under Engineer Corps, No. 414 Custom House, San Francisco. This quarry is on the sea cliff within the Fort Barry reservation, just inside of the Golden Gate; elevation 50 to 100 feet (U. S. G. S.). The quarry was opened up in 1900 to provide rock for concrete work in the fortifications. Since the first large job it has been worked only occasionally. The plant of 80 tons daily capacity is equipped with a No. 5 Gates gyratory crusher, 60 h.p. steam boiler (coal fired), 40 h.p. upright engine for hoist, 25 h.p. Westinghouse "Junior" engine, wire screen (for two sizes), and bucket elevator. The rock is a metamorphic sandstone with occasional fine limestone streaks. At two or three other points on the reservation there are small cuts in red Franciscan chert, utilized for road material.



Panoramic photo. Quarry and pier of San Francisco Quarries Company at San Pedro Point, Marin County, California.

Raymond Land Company (see Short Ranch).

San Francisco Quarries Company (one time called Jordan Quarry, also San Francisco Bay Improvement Company). Anson Blake, president; L. A. Wittenmyer, secretary; S. H. Whitney, superintendent. Home office, Balboa Building, San Francisco. This is one of the three McNear quarries at San Pedro Point, 6 miles east of San Rafael. Beginning January, 1914, this company also has a lease on the third quarry which is between its present working face and the McNear Brick Company plant. This third quarry was at one time operated by Gray Bros. and later by the Western Development Syndicate, but has been idle for several years.

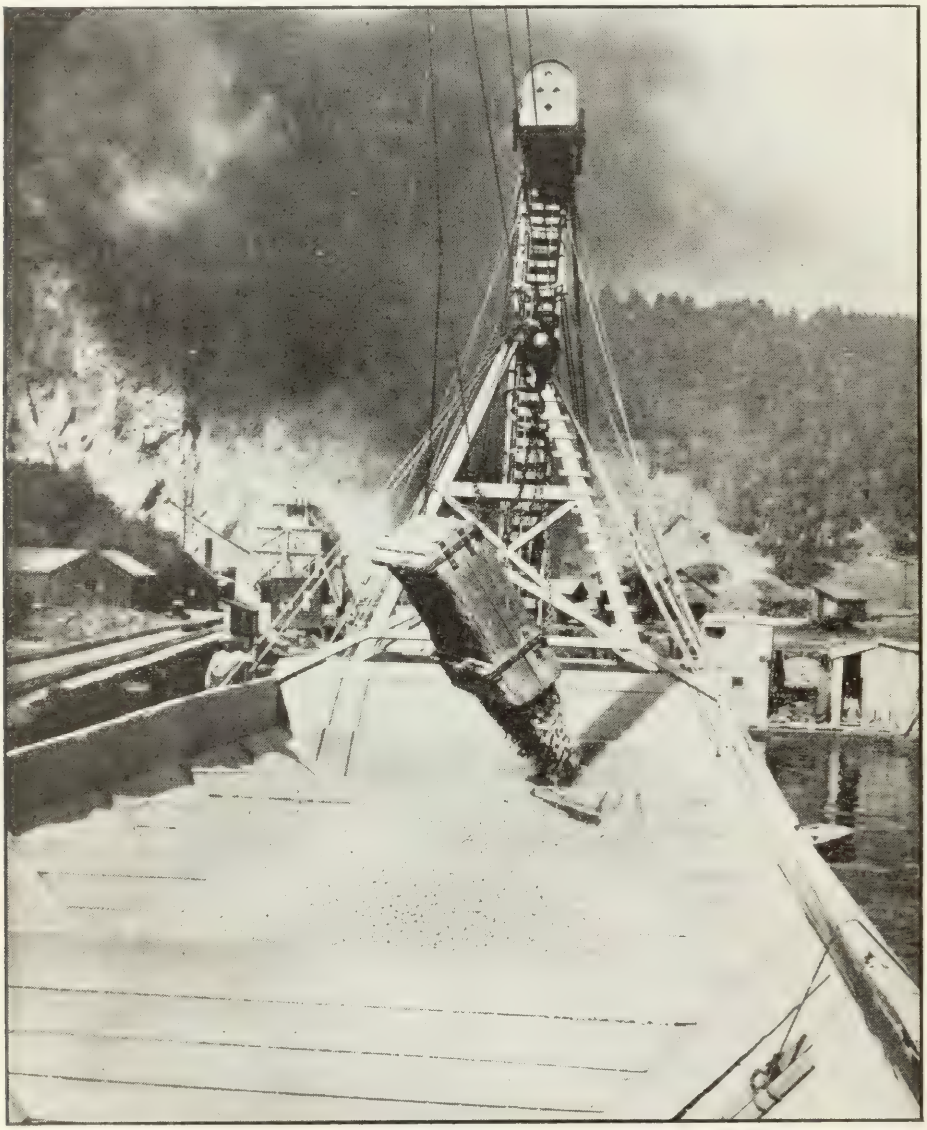


Photo No. 120. Barge "San Pablo" (self-dumping) of San Francisco Quarries Company at pier, Marin County, California. Showing bin arrangement.

The San Francisco Company's main quarry was opened up originally in 1876 by Dennis Jordan, and this company has been operating it the past ten years. The quarry is credited with a total output to date of about 3,000,000 cubic yards. "Sling" rock (large single pieces), rubble, and crushed rock are supplied. It is on the bay shore (see panoramic photo). The rock is hauled in skips on cars to the wharf and loaded onto the barges by a derrick.

The rock is a massive, hard, blue-gray metamorphic sandstone, and a fine face of up to 200 feet high (see photo No. 122) and about 500 feet wide is now exposed. There are occasional small lime and quartz seams. Steam operated machine drills are used. There are four derricks, with steam hoists, burning coal. The crushing plant, with a capacity of 700 tons per day, uses electric power. In addition, 300 tons of rubble per day can be handled, making a total daily capacity for the quarry of 1000 tons, with about 100 men employed. The output varies with the market demands. Crushed rock is delivered in San Francisco at $1.20 per cubic yard, or it is sold at the quarry pier at 90 cents to $1. These prices are for large tonnages.

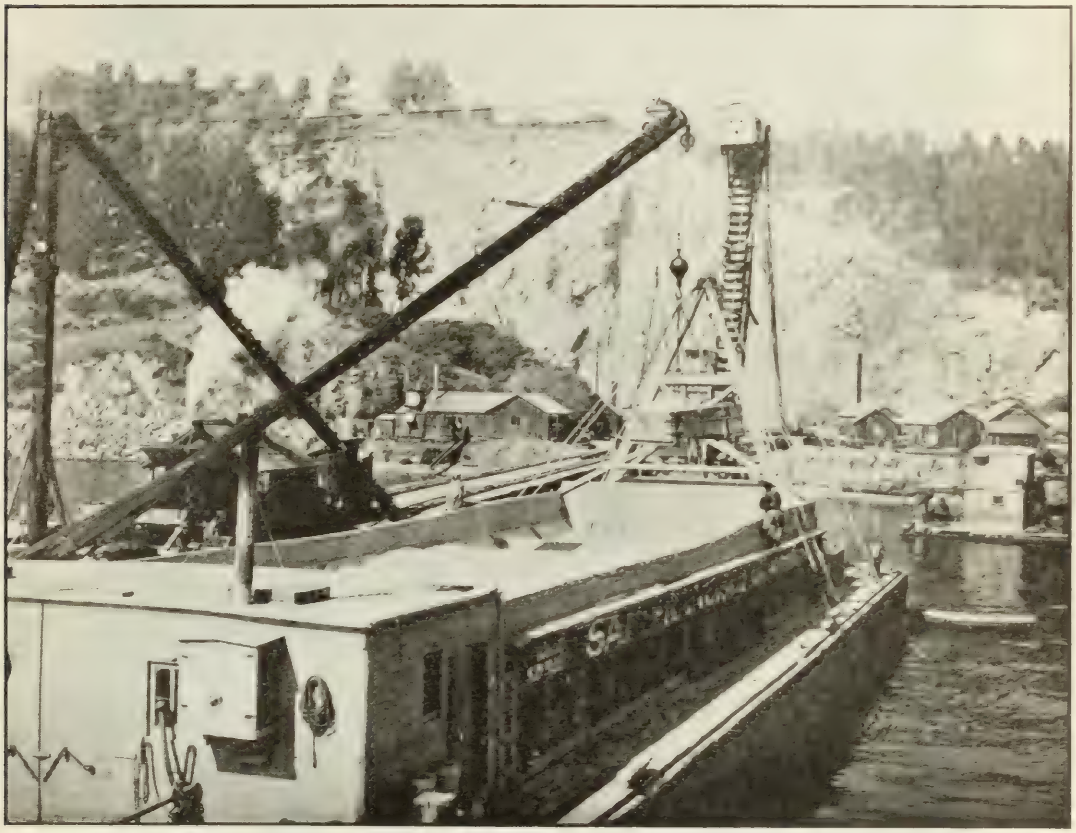


Photo No. 121. Barge "San Pablo" of San Francisco Quarries Company, at pier. Side view.

The company has six barges with capacities of 400 to 600 tons each. The 600-ton barge (see photos No. 120 and No. 121) is self-discharging and carries a crew of five men. In the hold there is a dynamo run by a 50 h.p. gasoline engine. This furnishes power for the motor driving the conveyer belt under the pockets and the motor at the head of the bucket elevator. The bucket elevator can be raised and lowered and swung sideways on an arc so as to vary the point and height of discharge as required. It is stated that this barge cost $40,000 to build and equip. From 4 to 5 hours are required to load 500 cubic yards into it by derrick, but at the San Pablo quarry (Contra Costa County) of the same company, the same amount is loaded by two conveyer belts in 1½ hours.

Bibl.: Bull. 38, p. 319.

Photo No. 122. Two hundred-foot high quarry face of San Francisco Quarries Company, Marin County, California.

The San Rafael Development Company has a quarry of red rock at the end of Mission street (Pine Hill), San Rafael, but it has not been operated recently.

Short Ranch Quarries. Dodge & Croker, San Anselmo, and the Raymond Land Company, 1048 Mills Building, San Francisco, each has a small quarry on land formerly a part of the Short ranch, 1 mile north from San Anselmo. They are both operated intermittently, and the product is used for curbs and rubble walls, being sold at $2 to $5 per load (about 2 cubic yards). The rock is a blue metamorphic sandstone.

Steffini-Bartini Company (see Hotaling).

Tiburon Point Quarry (see Northwestern Pacific Railroad Company).

Western Development Syndicate (see San Francisco Quarries Company).

Wetmore Bros. (see Daniel Contracting Company).

NAPA COUNTY.

Field Work in September, 1913.

Napa County, with a land area of 783 square miles, is about 50 miles north and south, by 26 miles in width. It runs nearly to a point at both extremities, its southern end touching San Francisco Bay. It is bounded on the east by Yolo and Solano counties and on the west by Lake and Sonoma counties. The main drainage system of the county is that of the Napa Valley; in addition to which, Putah Creek flows across the northeast corner, southeasterly to the Sacramento River. Mt. St. Helena is in the northwest corner, at the junction with Lake and Sonoma counties. The principal mineral resources include quicksilver, cement, mineral water, stone industry and magnesite; with infusorial earth, limestone, copper, iron, chromite, gold, silver, and mineral paint also occurring, but of minor importance (at least in their present lack of development).

The available published records show for Napa County, to the end of 1913, a total value of quicksilver produced of practically $15,000,000, and of mineral water nearly $2,000,000. That these values are below the actual output is known, as there are no segregated figures for mineral water previous to 1894; and also as the product of some of the quicksilver mines was included in the earlier reports of the state's production, under ''various mines.'' In fact, the Knoxville mines alone are said to have produced $17,000,000 in quicksilver, while Oat Hill is credited with another $5,000,000, to say nothing of the Aetna and others. There being but the one cement plant in the county, the value of the cement output is included under ''unapportioned,'' it being the policy of the Bureau not to make private business public. Magnesite production in Napa County began at the Chiles Valley mines in 1891; but the figures for 1892 and 1893 were not segregated, being combined with those of Alameda County. The value of the materials included under ''stone industry'' is showing a healthy, steady advance. Mineral water shows considerable fluctuation, but continues an important factor.

CEMENT.

Standard Portland Cement Corporation. The manufacture of cement in Napa County began with the operation of this company's plant on March 17, 1903, since when it has been a continuous, steady producer. The capacity has been doubled from its initial figure, being now 2500 barrels of cement daily. Geo. F. Cameron is president, L. F. Young, secretary, with A. G. Lang superintendent at the plant; home office, Crocker Building, San Francisco. The plant is in Sec. 19, T. 4 N., R. 3 W., ½ mile from Napa Junction station of the Southern

NAPA COUNTY—Table of Mineral Production.

Year	Quicksilver		Mineral water		Magnesite		Stone industry.	Limestone		Miscellaneous and unapportioned	
	Flasks	Value	Gallons	Value	Tons	Value	Value	Tons	Value	Kind	Value
Manhattan Mine output 1863 to 1876	3,594	$235,876	*	*							
1862	444	16,139									
1863	852	35,852									
1864	2,714	124,573									
1865	3,545	162,716									
1866	2,254	119,755									
1867	7,862	360,866									
1868	9,808	450,187									
1869	6,598	302,848									
1870	5,766	330,853									
1871	4,098	258,584									
1872	4,876	321,475									
1873	5,266	423,018									
1874	11,705	1,231,132								Gold and silver	$93,000
1875	9,453	795,470									
1876	11,303	497,332									
1877	13,127	489,637									
1878	10,810	355,649									
1879	9,446	281,961									
1880	6,830	211,730									
1881	7,746	231,063									
1882	9,013	254,467									
1883	7,784	223,790									
1884	5,188	158,234									
1885	3,891	119,648								Gold and silver	$5,000
1886	5,656	200,788								Gold and silver	16,000
1887	6,247	264,717								Gold and silver	22,500
1888	5,150	218,875								Gold and silver	50,000
1889	5,402	243,090								Gold and silver	95,000
1890	3,934	206,535								Gold and silver	57,046
1891	4,896	221,544			1,500	$6,000				Gold and silver	30,517
1892	8,612	350,595								Gold and silver	23,689
										Total gold and silver	$392,752
1893	11,505	422,809									
1894	9,705	298,016	97,275	$41,231	1,440	10,240				51 tons infusorial earth	$2,040
1895	9,318	372,500	199,397	99,700	2,200	17,000					
1896	11,411	403,031	218,680	81,335	1,500	11,000					
1897	12,281	459,753	159,896	81,948	1,143	13,671					
1898	12,368	472,972	169,261	63,919	1,263	19,075					
1899	11,696	598,322	171,567	85,964	1,180	17,130					
1900	8,724	403,500	171,000	72,200	1,983	17,400					
1901	7,798	388,176	158,830	109,900	700	11,622		8,919	$6,690		
1902	7,142	304,474	236,229	97,048	150	450	$500	7,086	8,496		
1903	7,859	333,006	244,400	124,000	61	915	3,375			290,368 barrels cement	435,552
1904	†5,328	199,586	386,000	104,750	12	78	4,019				
1905	4,853	171,910	279,400	89,500			500				
1906	2,380	86,870	84,000	90,500			2,777				
1907	2,500	95,400	240,000	103,600			3,000				
1908	2,340	98,912	145,500	101,090			78,728				
1909	1,625	80,535	123,072	96,279			138,636			Unapportioned, 1900 to 1909, inclusive	3,151,182
1910	646	29,231	152,772	92,960			122,219			Unapportioned, 1910 to 1913, inclusive	2,893,786
1911	140	6,441	141,540	86,530			127,428				
1912	287	12,065	136,750	81,997	55	550	172,646				
1913	287	11,546	151,520	75,548			243,759			Sandstone	8,000
Totals	334,063	$14,948,054	3,667,089	$1,779,999	13,187	$125,131	$897,587	16,005	$15,186		$6,883,312

*Napa Soda Springs have been bottling water for sale since 1860; but no segregated figures available for Napa County previous to 1894.
†Flasks of 76½ pounds to June, 1904, of 75 pounds since.

Totals.

Quicksilver	$14,948,054
Mineral water	1,779,999
Magnesite	124,581
Stone industry	897,587
Limestone	15,186
Miscellaneous and unapportioned	6,883,312
Total to end of 1913	$24,648,719

Pacific Railroad, with which it is connected by spur tracks direct to the mill. Tidewater is only 1½ miles distant, but not utilized as yet. The same company also has a 12,000-barrel per day plant at Davenport in Santa Cruz County.

For the benefit of those who may not be familiar with the process of making "Portland" cement, a short description is here given:

*"By a Portland cement is meant the product obtained from the heating or calcining up to incipient fusion of intimate mixtures, either natural or artificial, of argillaceous with calcareous substances, the calcined product to contain at least 1.7 times as much of lime, by weight, as of the materials which give the lime its hydraulic properties, and to be finely pulverized after said calcination, and thereafter additions or substitutions for the purpose only of regulating certain properties of technical importance to be allowable to not exceeding 2 per cent of the calcined product."

Photo No. 44. Clay pit of the Standard Portland Cement Company, Napa Junction, Napa County.

This definition lacks the requirement of pulverizing or artificial mixing of the materials prior to burning; and thus permits the inclusion of some "natural Portlands" under the specifications.

The ideal Portland cement would consist essentially of lime and silica in the proportions of 73.6 per cent and 26.4 per cent respectively (tricalcic silicate, $3CaO, SiO_2$), but as such a material can not be clinkered, except in the oxyhydrogen blowpipe or the electric furnace, it is

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*Professional Paper No. 28, Corps of Engineers, U. S. A., p. 30.

impossible to produce it commercially at the present time. For this reason it is necessary in actual practice to have other ingredients present to act as a flux and thus lower the temperature of fusion, permitting the combination of the lime and the silica. Alumina (Al_2O_3) and iron oxide (Fe_2O_3) fill this role. The raw mixture, before burning, is made up approximately as follows: 75 per cent lime carbonate ($CaCO_3$); 20 per cent silica, alumina and iron oxide together; 5 per cent impurities, including magnesia, sulphur and alkalies, some of which are always present. These materials, after being dried, are ground fine, the grinding accomplishing also the additional purpose of thoroughly mixing the constituents. Then they are heated to the point of incipient fusion (2500°–3500° F. in the hottest zone), thus forming "clinker"—a bluish black in color, and more or less porous in appearance. The clinker, in turn, is finely ground (up to 2 per cent of gypsum being added to retard setting), so that 90 per cent to 95 per cent will pass 100-mesh screen, and 75 per cent to 85 per cent through 200-mesh. This almost impalpable powder is the Portland cement of commerce, named "Portland" originally, not from the locality where it was made, but from its resemblance after setting to the oolitic limestone found at Portland, England.

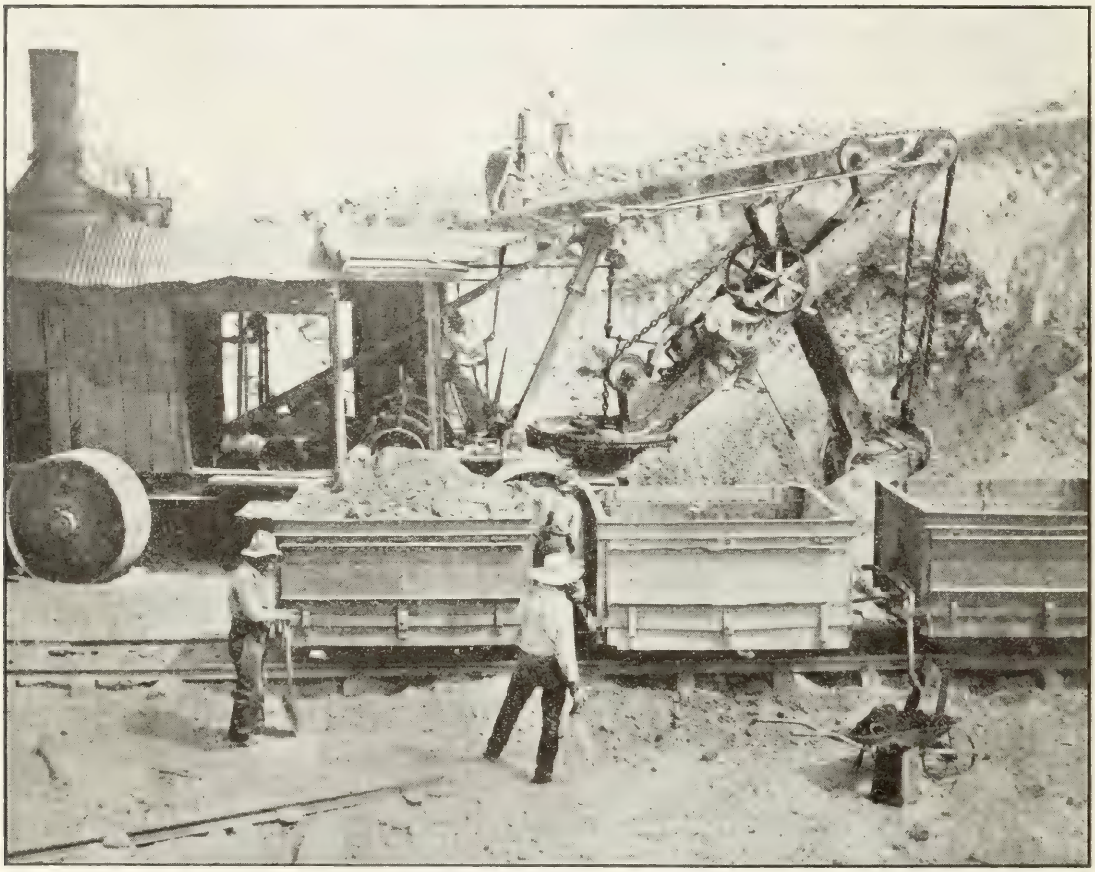

Photo No. 46. Steam shovel in limestone quarry of Standard Portland Cement Company, Napa Junction, Napa County.

Eckel ("Cements, Limes and Plasters," 1905, p. 494) says that normally a 60-foot kiln, working on a dry mixture will produce from 140 to 180 barrels of cement per day of twenty-four hours. Of coal as kiln fuel, 120 to 140 pounds are required per barrel of cement. One gallon of crude oil is equivalent to 10 pounds of coal, or 11 to 14 gallons of oil are required per barrel of cement. The capacity of a given kiln is lower with oil than with coal. Oil is used principally in California and Colorado. Of natural gas, 20,000 cubic feet are required as the equivalent of one ton of coal. Gas is used principally in Kansas and Ohio. For kiln linings, bricks of the following materials are used: Cement clinker, alumina, magnesia (calcined magnesite) and bauxite. The power and machinery required for grinding the clinker are about the same as for the raw materials; for, though the tonnage to be handled is only about two thirds, the material is much harder.

Photo No. 47. Rotary driers in mill of Standard Portland Cement Company, Napa Junction, Napa County.

At the plant of the Pacific Portland Cement Corporation limestone and clay are obtained from pits close by the mill, though at present, owing to a decrease in the lime content, a portion of high grade lime rock from near Santa Cruz is added, to "sweeten" the charge, before passing through the drier. In the quarry the clay is loaded by hand, and the limestone by a Marion steam-shovel ($1\frac{1}{2}$ cubic yards dipper), oil-fired (photos Nos. 44 and 46). The cars are drawn to the foot of the mill incline by cables and by a small steam locomotive. After passing through the gyratory crushers (one No. 9, three No. 5, Allis-Chalmers), the material goes to bins from which the rotary driers are fed. There are two rotary driers, oil-fired, 6′ x 40′, set on a grade of $\frac{3}{4}$ inch per foot, and running at $3\frac{1}{2}$ r.p.m. (photo No. 47). A steel "drag conveyer" takes the dried product to the ball mill bins. The excess over the ball mill feed, on day shift, goes to storage bins for the night shift feed, as the quarries are not worked at night. There are thirteen ball mills, running 24 r.p.m., divided between the raw crushing and the clinker ends of the process. After the ball mills, the mixture is further ground in tube mills (seventeen in entire plant, each 5′ x 22′, running 24 r.p.m.) and then passes to the rotary kilns, where it is clinkered.

Photo No. 49. Rotary kilns in mill of Standard Portland Cement Company, Napa Junction, Napa County.

Samples are taken of the raw material after the drier, and again at the end of the ball mills. The finished product is sampled after the tube mills. This plant has two rotary kilns (photo No. 49), 7′ 6″ diameter x 125′ long, and ten, 6′ diameter x 60′ long. The larger ones are run at $\frac{1}{2}$ r.p.m. and the others at 1 revolution per $1\frac{1}{4}$ minutes. All are set at a grade of $\frac{3}{4}$ inch per foot. The capacity of the two large kilns is about 1000 barrels per day, while that of the ten small ones is about 1500 to 1600 barrels. They all use crude oil for fuel. As the clinker falls from the kiln it is sprayed with water, partly to cool it but principally to break it up, and then elevated to the cooling tower (seen in the right edge of the photograph). The cooling towers have baffle plates to check the fall, and have air circulation. The desirable average size of the clinker is about that of a hickory nut. The higher the percentage of lime, the smaller is the clinker; while with a lower lime content, the mixture has a tendency to fuse more and form larger masses. The lime content is kept at about 74.5 per cent $CaCO_3$ before entering the kilns, the balance being clay. Gypsum is added to the clinker as it goes to the ball mills, and is represented by 1.75 per cent SO_3 in the finished product. As the California plants all burn oil, it is not necessary to take into account the addition of fuel ash, as in the eastern plants using powdered coal. It is advisable to carry alumina as low as possible, to give the cement a slower set and greater ultimate strength.

Photo No. 51. Final tube mills in mill of Standard Portland Cement Company, Napa Junction, Napa County.

As there are times during inclement weather when the quarries can not be worked, the raw end of the plant has a capacity somewhat in excess of the finishing, and the surplus clinker is stored. Belt conveyers are used both to and from this storage pile. The next step is grinding the clinker, a repetition of that preceding the burning—first in ball mills and finishing in tube mills (photo No. 51). From the discharge end of the tube mill, the finely ground powder is drawn by a suction blower through a tube to the storage bins. The storage bins have a capacity of 125,000 barrels of cement. Here it is sacked (95 pounds each) using a mechanical filling device and loaded directly into the freight cars. Electric power is used throughout the mill, and belt and other mechanical conveyers wherever possible. About 3500 h.p. is consumed, there being two 800 h.p. motors besides a large number of smaller ones. The tubemills are all of the trunnion type. The company has 200 men at work, with a monthly payroll of $16,000 to $18,000. The mill is operated continuously throughout the twenty-four hours. Twenty-five thousand gallons of water are used per day.

As the geology of the deposit is described in Bulletin 38 (pages 180–182), it will only be summarized here. The limestone occurs in beds, 1 to 4 feet thick, which dip to the north at 40°. It is fossiliferous and party crystalline, and is overlaid by a yellow, calcareous clay. "The clay at the east end of the quarry is very calcareous, but at the extreme west end it is more argillaceous. Overlaying all is a dark brown adobe." About ⅓ mile south of the main pit, the company is opening a new quarry in a low, rounded hill, exposing beds of crystalline limestone mixed with some clay. Photo No. 54 is a general view of the plant from the southeast. It shows the clinker storage pile on the right, and part of the clay pit in the foreground.

Photo No. 54. Standard Portland Cement Company, general view of plant from southeast.

Bibl.: Bull. 38, pp. 178-182; U. S. G. S., Bull. 243, p. 121; Bull. 522, p. 121; Min. Res. 1912, Pt. II, p. 518; CEMENTS, LIMES AND PLASTERS, E. C. Eckel, 1905.

CHROMITE.

There are undeveloped deposits of chromite, east of Napa, in Pope and Chiles valleys and near St. Helena.

Bibl.: R. IV, p. 136; V, p. 102; VI, Pt. I, p. 100; XIII, p. 49; Bull. 38, p. 363.

COAL.

It is reported that coal was struck at a depth of 30 feet, in digging a well on the ranch of H. P. Wallace, in Pope Valley.

COPPER.

There are a number of copper prospects in Napa County, but nothing of consequence has as yet been developed. The following locations may be named:

Napa Copper Company, 5 miles north of Calistoga, on Mount St. Helena, in Sec. 17, T. 10 N., R. 5 W.; T. A. Taylor, secretary, St. Helena.

Search group, 4 miles west of Yountville, in Sec. 5, T. 6 N., R. 5 W. E. F. Rossan, Glen Ellen, owner.

There are specimens of copper ore in the Mining Bureau museum from near Monticello by Koethen and More.

Juniper group, Manhattan (Knoxville), by F. K. McAllister; and

White Rock group, Manhattan, by Thos. A. Finnell.

Bibl.: Bull. 50, p. 165.

GOLD AND SILVER.

Brown and Smith Consolidated (*Mountain View,* also *Red Cloud*). This claim was located about twenty years ago, in Kings Canyon, near the Palisade mine, 3 miles north of Calistoga. They found nothing of value.

Bibl.: R. XIII, p. 234.

Calistoga Mine (see *Silverado*).

P. Flynn claims to have found a vein carrying gold values, on his ranch on the Oat Hill road north of Calistoga, in Sec. 30, T. 9 N., R. 6 W.

Griffith Prospect, on Alta Peak, 17 miles northeast of Napa. Some development work was done in 1895, but no values found.

Bibl.: R. XIII, p. 234.

Grigsby Mine (see *Palisade*).

Manuel Prospect. This prospect is located on patented (Mexican grant) land, 1 mile east of Calistoga, elevation 650 feet (bar.), and owned by Mrs. A. F. Mason. There is a quartz vein, showing about 300 feet of outcrop, striking northerly across a small ridge, and dipping east at about 50°. A crosscut adit has been run in about 200 feet, at a depth of 100 feet below the outcrop, and shows a quartz stringer in the face said to carry values in gold; but the main vein has not yet been cut. A lease has recently been given, under which development work will be done.

Palisade Mine. This silver mine (locally called "*Grigsby*") is in Sec. 24, T. 9 N., R. 7 W., 3½ miles northeast of Calistoga, elevation 625 feet (bar.). It was opened up in 1876 and the mill ran from 1888 to the spring of 1893. The two principal claims, Old Discovery and Ida Easley, are patented. R. F. Grigsby is the owner and still lives on the property, having a small ranch there also. The vein mineral is quartz carrying antimonial silver sulphide. A depth of 250 feet has been reached on the vein, and opened up by drifts for 1400 feet. It is situated on a north-south spur off the ridge which runs southeasterly from Mount St. Helena. The mill is equipped with 10 stamps (dry crushing), a 7-ton pulverizer, White revolving roaster, and amalgamation pans (four) and settlers (two) (Washoe process.) It is stated that 90 per cent extraction was obtained. In the four years during which the mill was operated, Grigsby states that he shipped 7,000 to 10,000 ounces of bullion per month. The average assay value of the ore was $24.50 per ton ($1 of which was in gold). The last ore treated assayed $35, but with silver down to 60 cents per ounce, it was not profitable. The water system (including water rights) was installed at a cost of $10,000. There are two pipe lines, each 3 miles in length, supplied by springs. This is at present in part utilized for running a small dynamo for lighting the buildings about the place.

Bibl.: R. V, p. 93; VI, Pt. I, p. 77; VIII, pp. 413–415; X, p. 363; XII, p. 376; XIII, p. 606; U. S. G. S. Mon. XIII, p. 370.

Silverado Mine (*Calistoga*). This mine, which is on the southeastern slope of Mount St. Helena at an elevation of about 2400 feet, in Sec. 2, T. 9 N., R. 7 W., 5 miles north from Calistoga, is owned by Harry Patten, Calistoga, R. F. D. The mine was opened up in 1872, and the 10-stamp mill operated four months in the latter part of 1874, being credited with a production of $93,000 from 2300 tons of ore. The vein which strikes about north with dip 73° W., is from 6 to 12 feet wide and carries silver sulphide with some values in gold. The ore at present exposed in the mine is stated to average $14 to $15 per ton in silver. In 1902, there were 34 tons of sorted ore shipped to the Selby smelter; and the same year, 1000 tons of ore from one of the old dumps were shipped to the smelter of the Copper King Smelting Company, on Suisun Bay, for use as flux, on account of its quartz. This ore assayed $1.10 per ton in gold and $2.65 in silver. The owner reports a lease under consideration.

Bibl.: R. VI, Pt. I, p. 77; X, p. 363; XII, p. 376; XIII, p. 606; MIN. RES. W. OF ROCKY MTS., 1874, pp. 63-65; 1875, p. 178; U. S. G. S. Mon. XIII, p. 370.

It is stated that on the east side of Conn Creek, placer gold "prospects" have been found, consisting of flour gold, and pear seed sized nuggets; but no ledge has ever been located there.

INFUSORIAL EARTH.

There is a deposit of infusorial earth on the ranch of Mrs. Kettlewell in Friends Valley west of Calistoga. It is not utilized. Also, there is a specimen of this mineral in the Mining Bureau museum, by R. E. Wood, from a small, undeveloped deposit 4 miles southeast of St. Helena.

IRON.

There are undeveloped deposits of iron ores at the head of Sulphur Creek, and in Conn Valley, also west of St. Helena. There is a specimen of hematite in the Mining Bureau museum from the "Stirling Iron Mine," by Dr. J. W. Hood of St. Helena.

Bibl.: R. II, p. 200; IV, pp. 229, 242, 258; XII, p. 327; XIII, p. 504; Bull. 38, p. 365.

LIME AND LIMESTONE.

In Pope Valley there were at one time two kilns in operation, but they have been idle for several years.

Bibl.: R. XIII, p. 629.

MAGNESITE.

The first commercial production of magnesite in California was from the deposits near Livermore, in 1886 (see U. S. G. S. Min. Res. 1886, p. 696), followed by shipments in 1891 from the Snowflake mine in Napa County. As will be noted by reference to the Table of Mineral Production, the industry in this county was active for about ten years, and then dropped off very abruptly. With the exception of a small tonnage from the Pope Valley deposit in 1912, these properties have been idle for the past ten years. The main drawback to the development and exploitation of these deposits is the lack of transportation. They are variously situated from 10 to 16 miles from Rutherford, their railroad shipping point.

The industrial uses for magnesite are many and varied, and the demand will no doubt increase materially in the next few years, particularly after the Panama Canal gives the California product a cheaper entry into the eastern markets. For most purposes magnesite is calcined before using. The largest tonnage at the present time is used in the manufacture of bricks for the lining of basic Bessemer converters both in steel and copper smelters. It is also employed in copper reverberatories and other special metallurgical furnaces such as for handling bullion; silver slimes; electric smelting; heating, welding and melting furnaces; calcium carbide kilns; and in the burning zone of rotary kilns in Portland cement plants. Wide variations of temperature, exposure, while hot, to currents of cold air or to contact with water or oil, will cause magnesia bricks to shatter and spall; so that the best results are obtained in furnaces where continuous heats are used. Not as high a purity of material is necessary in furnace liners, particularly for steel, as in some other uses; for in the case of basic open hearth steel furnaces, while the magnesite must be free (or at least very low) from silica, it can carry a noticeable percentage of iron oxide or serpentine without impairing its efficiency. In fact, by some it is considered an advantage, as such impurities permit the sintering of brick at a lower temperature than is possible with pure magnesite. ''Dead-burned'' magnesite—that from which *all* the CO_2 has been driven off—is hard to handle, having little or no plasticity. Its plasticity is said to be improved by adding partly calcined or caustic magnesite; also, heavy pressure will bind it sufficiently to allow the material to be sintered. As magnesia can be melted in an electric furnace, it would seem that it ought to be profitable to sinter such products in an electric furnace where electric power is as cheap as in California.

Another extensive and expanding field for the employment of magnesite is in the manufacture of artificial stone, flooring, tiles, wainscoting, etc. These products are put on the market under various trade names, among which may be mentioned: idealite, marbleoid, karbolith, monolith, American art marble, chemolith, artolith, asbestone, etc. The magnesite floors being put in steel railroad coaches for the Pennsylvania Railroad Company in the east, and the Southern Pacific Company in California, are by the Monolith Company of Milwaukee, Wis.; and those for the Pullman Company are by the Carbolith Company of Boston, Mass. The reaction made use of is that a moistened mixture of MgO and $MgCl_2$ will form a strong cement (known as oxchloride or Sorel cement); but there should be an absence of lime, as calcium chloride is hygroscopic and on hydrating swells, destroying the usefulness of the material. ''In using the cement for flooring, wainscoting, etc., it is mixed with sawdust or sand and coloring matter to give it the desired tint. It may be laid in a continuous sheet over considerable areas and is said to crack much less easily than Portland cement. The use of sawdust makes the material very much lighter in weight than cement, less hard, and more resilient'' (U. S. G. S. Bull. 355, p. 13). Soluble silicates of the nature of water glass are also used. A similar magnesia cement is used as a paint, but, of course, applied thinner. Such a "magnesite paint" was used as a finishing coat on the concrete building of the First National Bank at Healdsburg (see photo No. 153). "Porcelith" and "liquid stone" are two brands prepared by San Francisco firms from California magnesite. The former has been used on a number of buildings in San Francisco, notably the Hotel Shasta at Kearny and Bush streets. It is applied with a brush. The manufacturers state that "in using porcelith on brick or concrete walls, a gallon will cover about 70 square feet (two coats), and for cement plaster or smooth surfaced concrete walls from 110 to 120 square feet to the gallon according to the porosity of the walls." For use on wood it may be mixed thinner and sprayed on. For wood, it acts as a fire retardant.

Photo No. 153. First National Bank Building, Healdsburg, California. A concrete building finished with a magnesite paint.

In paper manufacture, in the "sulphite" process, a milk of lime and magnesia (calcined magnesite) is used as a carrier for SO_2, the gas being held in the mixture under pressure and thus introduced into the digester. The sulphurous gas digests the wood, leaving the fiber which is washed and used in making newspaper stock, wrapping paper, and the poorer grades of other printing and writing papers. The uses of the carbonic acid gas derived from calcinging magnesite are well known: carbonating beverages, refrigeration, etc. For these purposes it is liquefied by compression, to facilitate its transportation. CO_2 from magnesite is also used in borax refining. At the present time, however, as lime rock is obtained more cheaply, no magnesite is being used on the Pacific Coast for the manufacture of carbonic acid gas. Magnesite is used, mixed with asbestos, in boiler and steam pipe coverings. For these purposes the dolomitic varieties (containing lime) are serviceable, as they are lighter in weight. When magnesite is burned at a light red heat, the resulting magnesia has a low specific gravity (3.0), possesses sufficient plasticity to be molded into shapes, and will gradually absorb water and CO_2 from the air, similar to quicklime. If, however, the calcination is at a higher temperature, the resulting magnesia is heavier (sp. gr. 3.6 to 3.8), has no plasticity and will not recarbonate on exposure. In making magnesia bricks, a mixture of the two forms is employed—the light magnesia making up 16 per cent to 25 per cent.

Bibl.: R. VI, Pt. I, p. 119; XII, p. 328; XIII, p. 505; Bull. 38, pp. 327–334; U. S. G. S. Bull. 355; Min. Res. 1886, p. 696; 1891, p. 584; 1903, p. 1134; 1904, p. 1172; 1912, Pt. II, pp. 1072–1077; CEMENTS, LIMES AND PLASTERS, E. C. Eckel, 1905, pp. 149–167.

Berthenia Mine, in Soda Canyon, 12 miles east of Rutherford, S. H. Delmater, Chiles, owner; and adjoins the Matthai group. It has been idle for several years.

Bibl.: R. XII, p. 328; XIII, p. 505.

Blanco (see *Snowflake*).

Cleveland (see *Matthai*).

Matthai Mines. This group is owned by Frank Matthai, St. Helena, R. F. D., and located in Sec. 36, T. 8 N., R. 4 W., the "North Mine" (formerly Cleveland) being in Soda Creek Canyon just above the road, and the "South Mine," ¼ mile to the southeast and on the north bank of Greasy Camp Creek. At the former magnesite outcrops in irregular masses in the serpentine, but at the latter there is a 5-foot vein of good quality. Several years ago, a fair tonnage was shipped from surface cuts here; but nothing has been done of recent years.

Bibl.: Bull. 38, p. 328; U. S. G. S. Bull. 355, p. 31.

Pope Valley Deposit (*Walters,* also *White Rock*). There are two claims White Rock and Fairweather in this group, owned by J. B. Duvall et al., Pope Valley post office, in Sec. 2, T. 9 N., R. 5 W., 14 miles northeast from St. Helena, and 16 miles from Rutherford, its shipping point. The older of these two claims—"White Rock"—was located in the '70s, but no mineral was shipped from it till about 1894. A total of about 2000 tons is reported to have been shipped during a period of five years, since which no production has been made except a small tonnage in 1912. The deposit is about 400 feet above the level of Pope Creek, on an open hillside, bare except for scattered chamiso brush, and the bold white outcrop and quarry face can be seen from the valley below for several miles around. There are three main groups of veins—two on the east side and one on the west side of a small ravine—the entire grouping totaling a width of over 300 feet on the surface. The country rock is a "serpentinized lherzolite" (U. S. G. S. Bull. 355, p. 28). The western vein of the main east group shows up to 10 feet wide, of which 5 feet on the footwall is solid white magnesite, the upper 5 feet containing inclusions of serpentine. The veins strike northwest and dip to the east. The deposit is prospected by 400 feet of tunnels and a shaft of 90 feet, besides several surface cuts. Most of the magnesite is high grade and pure white, but in the large cut there is considerable cream-colored material. The geology of the deposit is described in detail in the references noted.

Bibl.: Bull. 38, p. 330; U. S. G. S. Bull. 355, p. 28.

Priest Mine. On the Priest ranch in Chiles Valley, in Sec. 23, T. 8 N., R. 4 W., 13 miles north of east from Rutherford, there is a deposit of magnesite, on which some development work was done, but it has been idle since about 1900. Mrs. D. C. Priest, St. Helena, is the owner.

Bibl.; Bull. 38, p. 328; U. S. G. S. Bull, 355, p. 31.

Russell Deposit. In Sec. 24, T. 8 N., R. 4 W., in Chiles Valley, 15 miles from Rutherford, there are several small veins outcropping, and a small tonnage was shipped at one time, but nothing has been done of recent years. T. B. Eddington, Napa, agent.

Bibl.: Bull. 38, p. 329; U. S. G. S. Bull. 355, p. 31.

Snowflake and Blanco Mines. These mines are in Sec. 29, T. 8 N., R. 4 W., 11 miles south of east from Rutherford, and about 2 miles south of the old Chiles mill in Chiles Valley. The present owners are San Francisco parties; T. B. Eddington, Napa, agent. Operated by Stanley and Bartlett, these mines, as already noted, began shipments in 1891, and produced over 1000 tons of magnesite per year for a period of nine or ten years. The ore was calcined before shipment, in wood-burning kilns. The country rock is a dark green to black serpentine, and the veins are from 1 to 6 feet in thickness. Some of the veins are considerably mixed with serpentine, and there is extensive silicification along the footwalls of some. In the brecciated portions there is crystalline magnesite, pale green to yellowish green in color. Analyses of magnesite from this property are given in U. S. G. S. Bull. 355 (loc. cit.). No work has been done of recent years.

Bibl.: R. XII, p. 328; XIII, p. 505; Bull. 38, p. 329; U. S. G. S. Bull. 355, pp. 29–31; Min. Res. 1891, p. 584.

Walters (see *Pope Valley*).

White Rock (see *Pope Valley*).

MANGANESE.

There are specimens of manganese ore in the Mining Bureau museum from near St. Helena by J. Graham and by F. W. Keeney; also from Moore Creek by R. A. Coleman; but the deposits are undeveloped. The former, which is in Sec. 19 or 20, T. 7 N., R. 5 W., 3 miles west of Oakville, has recently been located by Thos. P. Bacon, 1446 Fernside boulevard, Alameda, and F. W. Keeney.

MINERAL PAINT.

The *Carl Browne* paint mine is on Benali mountain, 2 miles south of Calistoga, but has been abandoned for several years.

William Hansen reports that he has mineral paint near the Carl Browne deposit.

The property formerly known as the *Paint M. and M. Company,* or the California Paint M. and M. Company, 1½ miles east of Calistoga, is now owned by Mrs. Ellen M. Knoles. No work has been done on it for several years.

Bibl.: Bull. 38, p. 339.

MINERAL WATER.

As regards mineral springs, Napa County has many of the characteristics noted under this heading in the description of Lake County (*q. v.*). Napa, however, is more advantageously situated in the matter of transportation facilities. The Napa Valley runs northwesterly and southeasterly along the entire western side of the county, and has two lines of railroad (the Southern Pacific, and the Napa Valley Electric) connecting with tidewater at Vallejo and terminating at Calistoga in the north. Chiles, Pope and Berryessa valleys are in the eastern half of the county, and are connected with the western part by well kept county roads.

Ætna Springs. The Ætna Springs, owned by the Len D. Owens Company, are in Sec. 1, T. 9 N., R. 6 W., on a branch of Pope Creek, 16 miles north of St. Helena. Elevation 1000 feet (barometric reading). Lidell post office is at the springs. This property, now covering 1000 acres, includes the old Valley quicksilver mine, which was a producer of that metal in the later '60s and early '70s. It is maintained as a family pleasure resort, and is now kept open throughout the year. It is attractively situated and well kept, many improvements having been made of recent years. There are 5½ acres of lawn about the main buildings. There are accommodations for 130 guests. Water from the "Ætna" spring is bottled for sale. The following are the temperatures of the principal springs: "American Ems," 93° Fahrenheit (so-called from its similarity to the famous Ems of Germany); "Iron," 77°; Ætna, 68° (also called "Potassium"); "Soda," 94°; one other, 4 feet from "Iron," 86°. There are sulphur incrustations around the iron spring.

Bibl.: R. II, p. 10; IV, p. 330; VI, Pt. I. p. 68; VIII, p. 416; XI, p. 72; XII, p. 341; XIII, pp. 514, 597; U. S. G. S. Mon. XIII, pp. 371, 402; Bull. 32, pp. 203, 210; Water Sup. Pap. 338, pp. 156–159; GEOL. SURV. OF CAL., Geol. Vol. I, p. 91; MIN. RES. W. OF ROCKY MTS., 1873, p. 11; W. ANDERSON, "Mineral Springs and Health Resorts of California," pp. 69–72.

Calistoga Hot Springs. These springs, among the earliest known in California, are on the eastern edge of town, hardly five minutes walk from the railroad stations. This property, covering 108 acres, was owned for many years by the Leland Stanford Estate and rented for resort purposes; but in August, 1913, it was sold to H. S. White, 650 Brannan street, San Francisco. The new owner is planning to build a 100-room hotel, pipe the hot water to it from the springs, and otherwise improve the property. The design is so planned that other wings may be added as future demands may require. Because of the refusal to give a long-time lease, the place has remained without adequate improvements heretofore. Being situated on two railroad lines, and within about three hours ride of San Francisco, these springs have the making of an excellent resort.

The elevation is 365 feet (Southern Pacific Company). There is a flat, semimarsh area of 200 acres or more on the eastern side of Napa Creek, in which the hot sulphur springs occur. It is necessary to dig down only a foot or two anywhere in this area to get hot water. The mud is said to yield native quicksilver, on panning. The following temperatures were observed: 135° F. (well with hand pump); 171° (curbed with a barrel); 82°; 160° (much H_2S); 124°; 111°; 153°; 158° and 156°. The odor of sulphuretted hydrogen gas is more or less noticeable at all of them. It is stated that bathing in these hot waters has proven efficacious in the treatment of rheumatism and similar complaints. No water is bottled from these springs.

Bibl.: R. I, p. 8; VI, Pt. I, p. 67; VIII, p. 416; X, pp. 349, 355; XII, p. 341; XIII, p. 514; U. S. G. S. Bull. 32, pp. 204, 210; Mon. XIII, p. 403; Water Sup. Pap. 338, p. 108; GEOL. SURV. OF CAL., Geol. Vol. I, p. 87; W. ANDERSON (op. cit.) pp. 114–116.

Congress Spring. Jessie W. Hamilton, owner; 3½ miles southwest of Napa.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 156.

Guillaume's (see *Pope*).

Hotel Calistoga. The Hotel Calistoga is on Lincoln avenue in the center of town of Calistoga; Owen Kenny, owner; B. F. Hughes, manager. There is a bored well from which hot water is pumped to a large concrete swimming pool and to a tank for bath service in the hotel. Water was struck at 2 feet depth, and tapping the same subsurface hot sulphur water as characterizes the Calistoga Hot Springs. When the pump is not running the well overflows a small stream. The temperature is 112° F. at the pump discharge.

Bibl.: W. ANDERSON (op. cit.), pp. 114–116; U. S. G. S., Water Sup. Pap. 338, p. 108.

Indian Spring (see *Pope*).

Jackson's (see *Napa Soda*).

Lathrop Hot Sulphur and Mud Spring, 1 mile south of Calistoga. This is similar to the Calistoga hot springs. There is a small bath establishment here, used locally.

Myrtledale Farm. This resort, 2 miles northwest of Calistoga is in a flat semimarsh area of 50 acres or so, similar in character to that in which the Calistoga hot springs are located, but is nearly 200 feet higher above sea level (550 feet bar.). The owner is R. R. Leveira. There is a bored well on the place which flows a small stream when the pump is not running; temperature 99° F. at pump discharge. At 300 to 500 feet from this well, are several mud springs which have the following temperatures: 128°, 134°, 112° F. There are accommodations for thirty in tents.

Napa Rock (see *Priest's Soda*).

Napa Soda Springs. Familiarly designated for many years "Jackson's Napa Soda," this is one of the oldest and best known springs of California, both as a resort and from its bottled water. This water has been on the market since 1860, the plant at the present time having a capacity of 1000 dozen splits per day. Contrary to the usual practice, "splits" (3 per quart) are used here instead of "quart" bottles (5 per gallon). The bottles have "Napa Soda," etc., blown in them, so that it is not necessary to use any labels. The spring has an air-tight cap fitted over it to retain the gas, which is again mixed with the water by agitation during pumping to the automatic bottle filling machine. Electric power is used; and an ice machine is included in the installation. Ten men are employed, including drivers of two 6-horse teams, which haul the product to Napa, 8 miles south. The bottling works are operated throughout the year.

The springs are in Sec. 2, T. 6 N., R. 4 W., at an elevation of 900 feet (U. S. G. S.) and are owned by Chas. H. Jackson, with Fiege and Hennings, lessees. Napa Soda Springs is the post office. It is said that this series of chalybeate springs situated along the hillside overlooking the Napa Valley, was originally used by the Nah-pah Indians; and that the Spaniards called them "Soda de Nah-pah," which, previous to 1850, was shortened to the present form—Napa. Several of the buildings are of stone (see photos Nos. 39 and 41)—a volcanic tuff from a quarry on the property. The grounds are well laid out, with flowers, ferns, palms, trees, etc., and threaded by numerous, broad-cut trails. There is a swimming pool which, being above the level of the buildings, serves as an emergency reservoir in case of fire. There are accommodations for 230. The springs showed the following temperatures; "Lemon," 66° F. (flow, 1 gallon in 5 minutes); old bottling house spring, 67° (flow 1 gallon in 2 minutes); "Napa Soda," 67° (flow, 1 gallon per minute); "Pagoda," 66°. The last two have considerable excess gas (CO_2).

Photo No. 39. At Napa Soda Springs, looking down lower drive.

Bibl.: R. VI, Pt. I, p. 69; VIII, p. 416; X, p. 362; XII, p. 341; XIII, p. 514; U. S. G. S. Bull. 32, pp. 207, 211; Water Sup. Pap. 338, p. 155; W. ANDERSON (op. cit.), pp. 201–207.

Napa Valley Mineral Water Company (see *Priest's Spring*).

Napa Vichy Spring. This spring, situated on the edge of the Napa Valley, 4 miles northeast of Napa, at an elevation of 90 feet (U. S. G. S.), is owned by John Lepori. This water, which is lightly mineralized, was first bottled in 1895. Previous to that, the place was maintained as a resort. The bottled product is artificially carbonated. The bottling works use electric power. The temperature of the spring is 66° F.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 255.

Photo No. 41. "The Rotunda" at Napa Soda Springs, Napa County.

Original White Sulphur Springs (formerly *White Sulphur Springs*). These springs are 2 miles south of west from St. Helena, in Secs. 3 and 4, T. 7 N., R. 6 W., at an elevation of 400 feet (bar.); John Sandford, owner. They are picturesquely situated, as there is considerable timber on the property (625 acres), consisting principally of redwood, "fir," and oak, with madrone and manzanita. The springs were discovered in 1845, and there have been three separate hotels destroyed by fire here. At present there are accommodations for 150, but it is intended to enlarge the capacity. No water is bottled for sale. The springs are all of the "white sulphur" variety, and sulphuretted hydrogen gas is given off from most of them. The following temperatures were observed: "Tank spring," 81° F.; back of bathhouse, 85°; "Mary Phillips' well," 78°; on road below "Mary Phillips," 83° (seepage from rock wall of canyon, indurated sandstone); cold sulphur, 59° (on bank of creek); "Mission Father's well," 69°.

Bibl.: VI, Pt. I, p. 69; VIII, p. 417; XII, p. 341; XIII, p. 514; U. S. G. S. Bull. 32, p. 209; Water Sup. Pap. 338, p. 254; GEOL. SURV. OF CAL., Geol. Vol. I, p. 87; W. ANDERSON (op. cit.), pp. 263, 264.

Phillips Soda Springs, 15 miles east of St. Helena; Bank of Halfmoon Bay, Halfmoon Bay, owner.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 161.

Pope Mineral Spring (*Indian Spring*). This spring, owned by Peter Guillaume, Yountville, is in Sec. 29, T. 9 N., R. 4 W., 21 miles northeast from Rutherford, and a mile west of Samuels Soda Springs. Bottling began in July, 1913. A portion of the water is put up at the spring, but the major part marketed is hauled in barrels to Yountville and there bottled, carbonated.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 162.

Priest's Soda Spring. This property, formerly a part of the Priest ranch, is now owned by A. Meyer, 3650 Grove street, Oakland, operating under the corporate name of Napa Valley Mineral Water Company. The bottling works are at St. Helena. The spring is in Sec. 23, T. 8 N., R. 4 W., 16 miles east of St. Helena. The present owner was the first to bottle the water, in 1898. It is hauled in a tank wagon holding 500 to 600 gallons, and bottled, carbonated, under the name of "Priest Soda Water" and "Napa Rock." There are two springs, the one not bottled carrying iron and magnesium. The principal one is stated to flow 12,000 to 15,000 gallons per day.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 161.

Samuel Soda Springs. These springs are in Sec. 28, T. 9 N., R. 4 W., at an elevation of 775 feet (bar.) on Trout Creek, a branch of Pope Creek. They are 10 miles northwest of Monticello, 24 miles northeast from Rutherford, or 30 miles northwest from Winters. They have been utilized for about forty years, the present owner being Robert J. Little. The water is hauled in drums to St. Helena and bottled by the St. Helena Bottling and Cold Storage Company. There are accommodations at the spring for sixty boarders, in addition to which there are camping grounds, also. The following are the principal springs: "Samuel Soda," 62° F., "Kidney," 64°; others 60°, 62°, 63°.

respectively. There is also a "magnesia" spring, ¼ mile from the hotel, and a "white sulphur" ½ mile distant.

Bibl.: R. XII, p. 341; XIII, p. 514; U. S. G. S. Water Sup. Pap. 338, p. 159.

Sequoia Resort. It is 8 miles northwest of Napa; elevation, 800 feet. Owner, Theo. Gier, Oakland. There are two springs—one fresh water, the other "sulphur," the latter of which is said to show, on analysis, in parts per million: sodium sulphate, 12.3; sodium chloride, 28.5; magnesium and calcium carbonates, 10. There are tents and cottages in addition to the hotel. C. M. Troppman is manager.

St Helena Bottling and Cold Storage Company (see *Samuel Soda*).

St. Helena White Sulphur (see *Original White Sulphur*).

Walters Springs. These springs are in Sec. 12, T. 10 N., R. 5 W., 16 miles northeast from St. Helena. H. L. Connor, owner; post office, Pope Valley. They are in a short side canyon on the north side of Pope Creek, at an elevation of 1170 feet (bar.), and are reached by a well graded wagon road. These springs have been known since about 1869, and in 1909 all of the buildings were destroyed in a forest fire. There are at present accommodations for fifty people. A small amount of water is bottled, regularly. There are two mineral springs—upper, 68° F.; lower, 66°. At both Walters and Samuel springs (5 miles to southeast) serpentine is the predominating rock. Between them there are sharp ridges of chert, along the north side of Pope Creek. Samuel Springs are on the south side of the creek.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 159.

White Sulphur (see *Original White Sulphur*).

Zem Zem Spring (see under *Onyx Marble*).

ONYX MARBLE.

There are specimens of onyx marble in the museum of the State Mining Bureau, from a locality formerly called "Zem Zem," near Knoxville. The deposit is not developed. There are calcareous springs near-by.

Bibl.: Bull. 37, p. 111; Bull. 38, p. 369; W. Anderson (op. cit.), p. 269; U. S. G. S., Water Sup. Pap. 338, p. 268.

PAVING BLOCKS (see Stone Industry).

PETROLEUM.

Petroleum and gas have been found in small quantities in sandstone west of Napa and Yountville, but not developed.

The *East Napa Mining Company* drilled to a depth of between 1000 and 1200 feet at the southern edge of Napa City, and at that depth claim to have found "oil indications," though they did not expect oil until a depth of 2500 feet was reached. Work stopped for lack of funds. A. Zeller owns the property.

Bibl.: R. XIII, p. 582.

QUICKSILVER.

Development work began on the quicksilver mines of both the Knoxville and the Pope Valley sections about 1860. In the former, the Lake (afterward merged with the Manhattan) was the pioneer, followed closely by the Redington; and in the latter district, the Valley mine (now a part of the Ætna mineral springs property) was the first. Although the industry had its ups and downs, Napa County was one of California's most important producers from 1864 to 1903, since which later date the decline has been very rapid. Though the present outlook is not particularly encouraging,* the success attending concentration experiments at the Ætna and Oat Hill mines, gives promise of at least a partial revival. (For more extended remarks regarding concentration, see introduction to Quicksilver under Lake County.) As has already been noted, Napa County's quicksilver mines are credited

Photo No. 29. Mill at Ætna Quicksilver Mine, Napa County.

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*Since the above was written, the price of quicksilver has more than doubled as a result of the European war.

officially with a production valued at $15,000,000, but with a reputed output in excess of $22,000,000.

Ætna Quicksilver Mine (formerly *Ætna Consolidated*). The Ætna group is at the southeast end of the Mayacmas district near the head of a branch of Pope Creek, on the ridge separating it from James Creek. It is in Secs. 2 and 3, T. 9 N., R. 6 W., 2 miles southeast from the Oat Hill mine and 9 miles northeast of Calistoga, though St. Helena (18 miles) is its railroad shipping point on account of better roads and easier grades. Post office is Lidell. The group consists of Phoenix, Silver Bow, Red Hill, Washington, Pope, and Star claims, all patented. Quicksilver ore is said to have been discovered here in 1854 by Lawley. It was later sold to Haufmeister et al., then to the Ætna Consolidated Quicksilver Company; then in 1904 the present owners, Lawley Brothers, Calistoga. Bror Soderhjelm, Lidell, is lessee. The earliest production was from the Phoenix. The most important producing periods of the Ætna group were between 1877 and 1887, and for about six years beginning with 1892. As the early figures were not segregated the total output can not be stated exactly, but it is estimated to be in excess of 36,000 flasks. The last two or

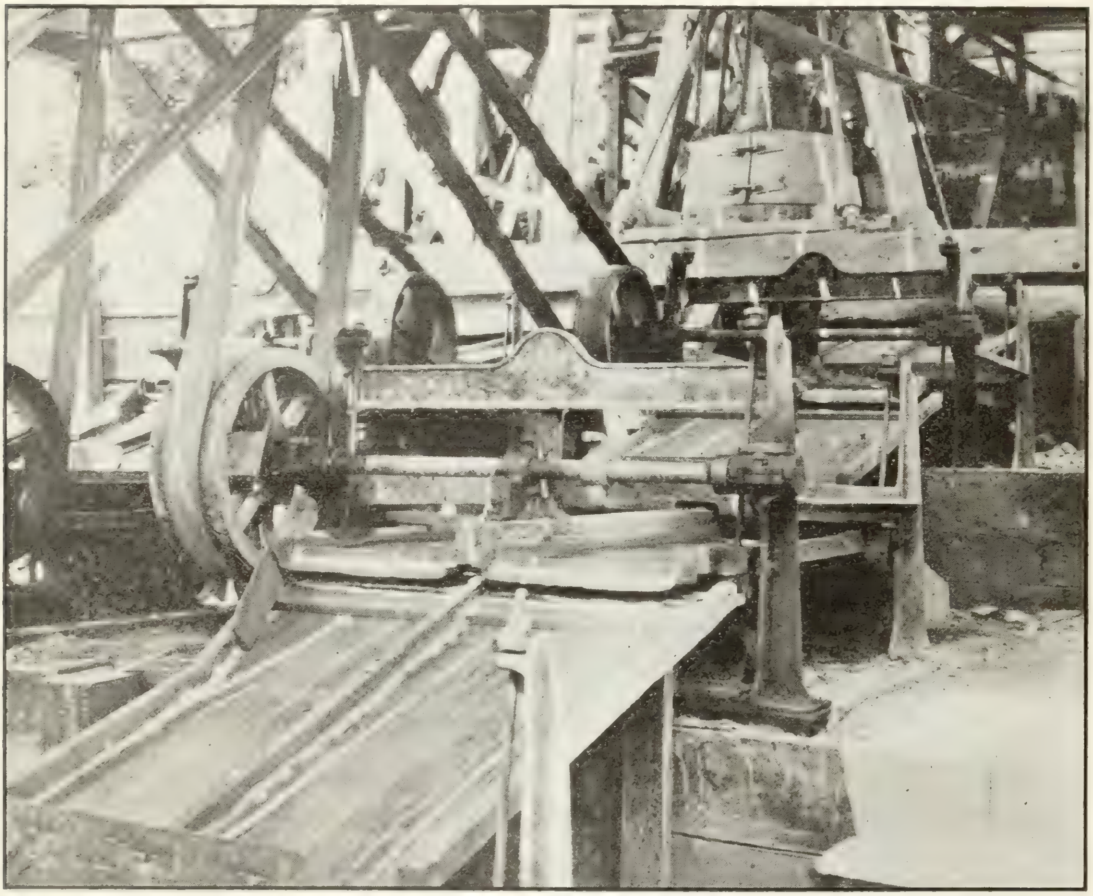


Photo No. 30. Concentrators in Mill of Ætna Quicksilver Mine, Napa County.

three years that the Ætna Consolidated Company had the mine mainly prospecting was done. In 1910–1912, a small production was made from clean-up by leasers around the old furnaces, and the retorting of small lots of sorted ore. An extended description of the geology and the underground workings is given in Bulletin 27, pp. 72–76; and in U. S. G. S. Monograph XIII, pp. 354, 371–374. In the Star mine, the shaft reaches a depth of 800 feet, and in the Silver Bow the tunnel (No. 9, in 3557 feet) attains a depth of 900 feet below the outcrop. No. 7 tunnel (7226 feet long) starts in the Phoenix and goes into the Silver Bow, while No. 9 (200 feet lower) starts in the Star and is driven into the Silver Bow. It was in the Silver Bow ground tapped by these two tunnels that the largest and most important ore body of the group was found, during the Ætna Consolidated regime. Above the No. 7 the vein was not over 3 or 4 feet wide, and with a steep dip. At that depth it flattened out, and widened to 20 feet between walls, extending to the No. 9—a veritable bonanza. Of mineralogical interest, it may be mentioned here that millerite (nickel sulphide) has been noted in the Ætna mine associated with cinnabar.

The present lessee has built a concentrating mill (see photos No. 29 and No. 30), which at the time of our visit (September 1, 1913) was equipped with a Dodge crusher, Griffin mill and six Gilpin County bumping tables, the whole being operated by a 40 h.p. distillate engine. It was observed that the Griffin mill made a considerable proportion of slimes. The Gilpin County bumpers seemed to collect most of the coarser cinnabar, but lost the fines. As we have already pointed out (see Lake County, introduction to quicksilver), it is very important to avoid sliming of cinnabar, as it is extremely friable. The use of a common power unit for both crushers and concentrators is also objectionable for effective concentration, on account of the variations of speed caused by the rock breaker. Having discussed these points with Mr. Soderhjelm at the time above noted he writes, under date of January 23, 1914, that he has taken out four of the bumpers and put one New Standard (Llewellyn Iron Works, Los Angeles) table in their place, "but the Standard table had too much to do; so I have ordered another, and if that is not enough I will have some more of the same kind, as the Standard seems to take kindly to the slime." Also, the concentrators are now being driven by a separate 5 h.p. engine. Ore from the surface cuts is soft and clayey, while that from underground is in part hard and siliceous. The capacity of the mill is stated to be 64 tons per eight hours. An 18-mesh screen is used on the Griffin mill. The concentrates are reduced in two "D" retorts, arranged with both a fan and a water-jet for draught. In the same letter above quoted: "I found that lime was not so good as charcoal with air in the retort, and I have to use lots of it, too, besides shaking it up two or three times.'' He had (September, 1913) seven men at work in the mine and five in the mill. Only hand drilling is done, and the ore is trammed by hand.

> Bibl.: R. V, p. 96; XI, p. 72; XII, p. 362; XIII, p. 597; Bull. 27, pp. 72–76; U. S. G. S. Mon. XIII, pp. 354, 371–374; Min. Res. 1884, p. 492, 1892, p. 148, 1902, p. 252, 1909, Pt. I, p. 553, 1910, Pt. I, p. 698, 1911, Pt. I, p. 901, 1912, Pt. I, p. 942; MIN. RES. W. OF ROCKY MTS., 1872, p. 523, 1873, p. 11, 1874, p. 30, 1876, p. 20; GEOL. SURV. OF CAL., Geol. Vol. I, p. 91; ENG. AND MIN. JOUR., November 1, 1913, p. 828.

Bella Union Quicksilver Company. The Bella Union Company, W. H. Hamilton, 556 Mills Building, San Francisco, attorney, owns the Bella Union and Oakville mines in Sec. 20, T. 7 N., R. 5 W., 1½ miles west of Oakville. The Oakville was a producer in 1872–73 (about 400 flasks) and the Bella Union is credited with 271 flasks in 1876; but the exact total figures are not available. The ore carries cinnabar with pyrite and calcite, and ''forms seams in the slates and irregular bunches connected by stringers of ore'' (Becker). In October, 1909, the Bella Union Company gave a working contract for the purchase of the mine, under which contract certain of the old tunnels were opened up, exposing some good ore. About April, 1910, work under the contract ceased and the contract forfeited; but the holder brought suit to have the company deed over the property upon payment of the agreed purchase price. The company prevailed in the suit. No work has been done since that time.

> Bibl.: R. IV, p. 336, table; X, p. 362; XII, p. 364; XIII, p. 599; Bull. 27, p. 76; U. S. G. S. Mon. XIII, p. 377; Min. Res. 1909, Pt. I, p. 553; MIN. RES. W. OF ROCKY MTS., 1873, p. 11; 1874, p. 30.

Boston Mine (see *Redington*).

Calistoga (see *Calistoga Hot Springs* under *Mineral Water*).

Corona Mine. The Corona is owned by the Vallejo Quicksilver Mining Company, J. B. McCauley, president; E. J. McCauley, 409 Carolina street, Vallejo, secretary. It is in Secs. 32 and 33, T. 10 N., R. 6 W., 9 miles southeast of Middletown, between the Oat Hill on the northeast and Twin Peaks mine on the south; elevation 2200 feet (bar.). The mine is on the contact of the sandstone of the Oat Hill mine and a serpentine belt. The geology of the deposit is described in Bulletin 27, page 79. The mine was opened up in 1895, but closed down in 1906, following a heavy winter, being driven out by water in excess of the pumping capacity. They also had furnace troubles on account of the large amount of pyrite occurring with the cinnabar. The pyrite rendered the ore self-burning, making it difficult to regulate the furnace temperatures, and the condensing. A white powder (probably sulphate of mercury) formed as an incrustation in the condensers, the result of reaction between the released quicksilver and SO_2 gas. This incrustation had to be broken out and retorted. The furnace, of the Scott type, is of 50 tons capacity. The mine is credited with a total production valued at $250,000.

Bibl.: R. XIII, p. 597; Bull. 27, p. 79; U. S. G. S. Min. Res., 1902, p. 252; 1908, Pt. I, p. 686.

Etna Mine (see *Ætna*).

James Creek prospect (see *Philadelphia*).

Knoxville Mine (*Boston, Redington*). This mine, known for years as the Redington, and later as the Boston, was first called "Excelsior" (Geol. Surv. of Cal., Geol. Vol. I, p. 92), being owned by the X. L. C. R. Mining Company. It was discovered in cutting a grade for a highway, and first appears in the producing column with 444 flasks in 1862. In 1867, the company was reorganized as the Redington Quicksilver Company. The present owner is F. E. Johnston, 4 Masonic Temple, Napa. The mine continued an important producer up to 1883. From that time to 1893 the output was only nominal (126 to 881 flasks per year), followed by five years of prosperity, since which, with the exception of 1908, the production has been small. The total has been 115,933 flasks to the end of 1912, exceeded in California (which also means the United States) by only two mines—New Almaden and New Idria. It is at Knoxville in the northeast corner of Napa County.

The geology and the underground workings are described in detail in several of the reports noted under Bibliography. There are three parallel, principal veins in the mineralized zone, and enclosed in serpentine. The cinnabar is associated with pyrite and quartz, the gangue mineral being principally a black opaline, in part resembling obsidian. Sulphurous waters in the mine are said to have caused trouble with iron pipes and machinery. At the time of our visit, one "D" retort was in operation, putting through a little sorted ore with material from the old Scott fine-ore furnace, which was being torn down. The ore was from the 150-foot level of the intermediate shaft (west of a line between the two older shafts), where a small body of fair grade ore was being blocked out. Three men underground (one miner, single-hand drilling, and two muckers) with five on top (including foreman and Chinese cook) were at work. Ore was hauled by wagon to the retort. Extensive tailings dumps around and below the furnaces indicate the former activity of this mine, which at one time employed over

600 men. During the seventies, the Redington Company had a contract with the Comstock mines for 400 flasks of quicksilver per month.

Bibl.: R. IV, pp. 179, 261, 289, 317, 329, 336 (table), 339, 340; VI, Pt. I, p. 122; X, p. 358; XI, pp. 69–71; XII, p. 363; XIII, p. 599; Bull. 27, pp. 76–79; U. S. G. S., Mon. XIII, pp. 10, 271–290, 464; Min. Res., 1883, pp. 394–396; 1884, p. 492; 1892, pp. 148, 160; 1902, p. 251; 1907–1912 (inc.), Pt. I; GEOL. SURV. OF CAL., Geol. Vol. I, pp. 92 and 99; Vol. II, pp. 128–132; MIN. RES. W. OF ROCKY MTS., 1867, p. 178; 1868, p. 264; 1871–1876 (inc.); TRANS. A. I. M. E., Vol. III, pp. 279, 285, 292, 301.

Lake Mine (see *Manhattan*).

La Joya Mine. Owned by James Rennie, Olympic Club, San Francisco, is in Sec. 24, T. 7 N., R. 6 W., 3 miles southwest of Rutherford. The property has been idle for several years, only a watchman being in charge.

Bibl.: Bull. 27, p. 80.

Manhattan Mine. This group, which includes the old Lake mine, is owned by the Lake Mining Company; R. B. Knox, Pacific Building, San Francisco, president. Besides the mining claims, the company has 320 acres of land in addition. It is in Sec. 6, T. 11 N., R. 4 W., and Sec. 1, T. 11 N., R. 5 W., 1 mile northwest of Knoxville and 20 miles southeast from Lower Lake. The mine was first worked in 1863, the place being then known as Johntown, and the ore reduced in the furnaces of the Redington mine. It was idle from 1877 to 1884, from which time to about 1907 it was again in the producing list. Its total production has been 15,933 flasks. No work has been done recently. As the mine and its geology have been described at considerable length in Bulletin No. 27, and in U. S. G. S. Monograph XIII, it will not be entered into here.

Bibl.: R. IV, p. 336, Table; V, p. 95; VI, Pt. I, p. 33; VIII, p. 412; XI, p. 71, 72; XII, p. 363; XIII, p. 598; Bull. 27, pp. 81–89; GEOL. SURV. OF CAL., GEOL. Vol. I, p. 92; Vol. II, pp. 126–128; MIN. RES. W. OF ROCKY MTS., 1867, p. 178; 1871, p. 15; 1874, p. 30; 1876, p. 20; U. S. G. S. Mon. XIII, p. 282; Min. Res., 1892, pp. 147, 160; 1902, p. 252; 1908, Pt. I, p. 686.

Mountain View (see *Simmons*).

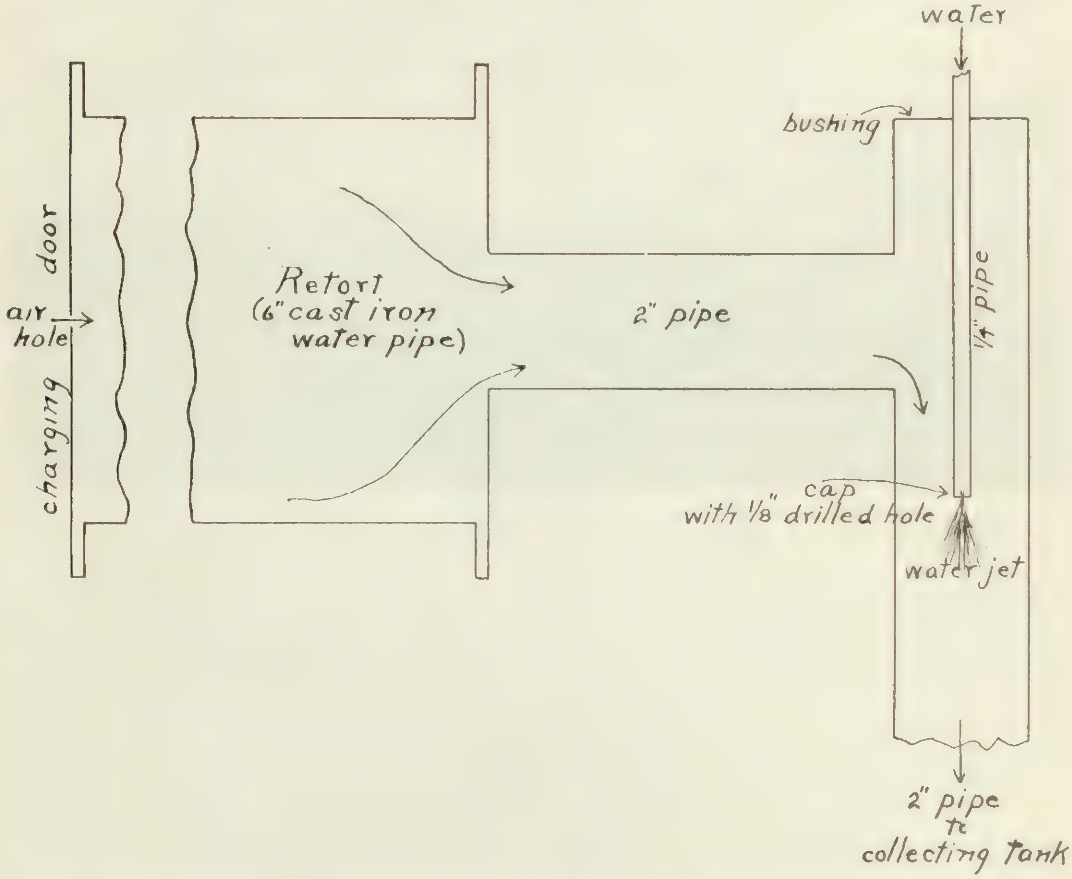
Napa Consolidated (see *Oat Hill*).

Northern Light prospect about 2½ miles west of Knoxville, near Lake County line; Fr. Josh, Lower Lake, owner. Idle.

Bibl.: Bull. 27, p. 92.

Oakville Mine (see *Bella Union*).

Oat Hill Mine (*Napa Consolidated*). This mine was for many years one of the important producers of California, having been opened up in 1867 and operated continuously up to 1909, when it was closed by the Napa Consolidated Company as being worked out. The present owner, E. J. Sittig, Berkeley, took it over in 1910. R. P. Newcomb, Middletown, is lessee. There are 17 claims in the group, all patented, lying at the junction of Secs. 27, 28, 33 and 34, T. 10 N., R. 6 W., between James and Bucksnorter creeks, and 9 miles southeast of Middletown. The total production is stated to have been between $5,000,000 and $6,000,000 in value.



Plan of water-jet condenser for quicksilver retort at Oat Hill Mine, Napa County.

The older worked ore shoots were on the Mercury and Manzanita veins, the later developments being to the southwest and around on the other side of the ridge, on the Escape, Eureka, Humboldt and Osceola veins. While the ore was connected with the veins and on their footwall, there was little cinnabar in the siliceous vein matter itself. The values occurred almost entirely as impregnations in the soft, light gray sandstone. The lenses of ore were all near to the surface, the deepest one, on the Eureka, reaching only a depth of 400 feet. In places, the stopes broke through to daylight. The largest single lenses were opened upon the Humboldt and Osceola veins, in both cases being stoped for a length of 500 feet. During the last two years that the Napa Consolidated Company operated, the territory outside of the zone explored by underground operations was prospected by boring numerous holes to a depth of 200 to 350 feet from the surface, with a Davis-Calyx core drill. During their last year, no underground development was carried on, only the ore then in sight being extracted.

Photo No. 28. Dumps of low grade ore at Oat Hill Quicksilver Mine, Napa County, from Eureka, Osceola and Humboldt veins.

It is estimated from the maps of the property that there are over 21 miles of underground workings in the mine. The elevation is 2250 feet (bar.) at the office. Equipment included two 50-ton Scott furnaces, which were dismantled and cleaned up when the mine was closed.

The present lessee, R. P. Newcomb, during the summer of 1913, had in operation one New Standard concentrating table (Llewellyn Iron Works, Los Angeles,) as a trial plant, screening, sluicing and concentrating material from the old, low-grade, mine dumps. At the time of our visit (September 1st) he was shipping in two additional tables, a revolving screen and another gasoline engine. A 5 h.p. engine operates the screen and a 1½ h.p. engine the concentrators. He estimates that there are in excess of 250,000 tons of ore on the dumps (photo No. 28 shows part of them) which can be economically treated by this method, and that he can handle at a profit material carrying as low as 0.15 per cent quicksilver (3 pounds per ton). Being a friable sandstone with impregnated cinnabar, and having lain out in the weather for some years, it is more or less disintegrated and air-slaked, requiring no crushing; so that it is particularly favorable for low-cost concentration treatment. The concentrates are retorted in a series of pipe retorts, using a water jet for draught and condensing purposes (see sketch). From the test plant runs Newcomb estimated that he could handle the material for about 40 cents per ton, or a cost of $10 per flask of quicksilver reduced, on a 0.15 per cent Hg basis. Four men are required for the 3-table plant to dispose of 50 tons daily. On the trails and roadways about the Oat Hill mine, after a rain, cinnabar can be seen concentrated among the rocks and small crevices of the water courses.

Bibl.: R. V., p. 96; VIII, p. 413; X, p. 270; XI, pp. 65, 72; XII, p. 364; XIII, p. 598; Bull. 27, pp. 89-91; U. S. G. S. Mon. XIII, pp. 354-358, 469; Min. Res., 1883, pp. 394-397; 1884, p. 492; 1888, p. 97; 1892, pp. 145, 160; 1902, p. 251; 1906, p. 497; 1907, Pt. I, p. 679; 1908, Pt. I, p. 686; 1909, Pt. I, p. 553; 1910, Pt. I, p. 698; 1911, Pt. I, p. 902; Eng. & Min. Jour., Nov. 1, 1913, p. 828.

Philadelphia (*James Creek* prospect). This prospect is near (southeast from) the Oat Hill mine. It has been abandoned since the death, a year or two ago, of the owner, Martin Pluth.

Bibl.: Bull. 27, p. 93.

Phoenix Mine (see *Ætna*).

Redington Mine (see *Knoxville*).

Silver Bow Mine (see *Ætna*).

R. C. Simmons, Yountville, has a quicksilver prospect in Sec. 2, T. 6 N., R. 5 W., about 1½ miles west of Yountville. It was worked some years ago, but is idle at present. This is probably the "Mountain View" (Rep. X, p. 362).

Summit Mine. It is 3 miles southwest from Rutherford, and was a producer in the early seventies. Idle.

Bibl.: R. XII, p. 365; XIII, p. 599; Bull. 27, p. 92; Min. Res. W. of Rocky Mts., 1874, p. 30.

Twin Peaks Mine. This mine near Oat Hill joins the Corona mine on the south, and is in Sec. 33, T. 10 N., R. 6 W., about 10 miles south of Middletown. It is owned by W. H. and E. L. Herrick, Middletown. The mine has been closed since 1906, in the two years previous tc which it had produced a total of $40,000 in quicksilver from a lens of ore. As the surplus is stated to have been all paid out in dividends and none used for further development, the mine was closed for lack of funds for development, when the pocket had been worked out. Assessment work only has been done since.

Bibl.: Bull. 27, p. 92; U. S. G. S., An. Rep. XXI, Pt. VI, p. 278; Min. Res., 1902, p. 252; 1907, Pt. I, p. 679; 1911, Pt. I, p. 902.

Valley Mine (see *Ætna Mineral Springs,* under *Mineral Water*).

Washington Mine (see *Ætna*).

Whitney Prospect. This prospect is in Sec. 21, T. 10 N., R. 5 W., 10 miles southeast of Middletown, on agricultural patented land owned by G. B. Whitney of Calistoga; Oscar Jacobson, Lidell, lessee. The property was not visited, but we were shown specimens of the ore, which is an impregnation of cinnabar in a schistose sandstone. The country rock is said to be sandstone and serpentine. Development consists of a short drift and winze, and several prospect holes. Jacobson writes he has "found ore for 50 feet across the ledge."

SAND AND GRAVEL (see Stone Industry).

SANDSTONE (see Stone Industry).

SILVER (see Gold and Silver).

STONE INDUSTRY.

Under this heading is included building stone, crushed rock, macadam, paving blocks, rubble, sand and gravel, and sandstone. In the hills along the western side of the Napa Valley basalt occurs, which has been quarried for paving blocks near St. Helena and Napa. At the surface, it appears mostly in the form of boulders which are the result of disintegration along cracks and flow lines. The interior of the boulders is for the most part hard, bluish and compact. There are occasional vesicles. Along the eastern side of the valley trachytic tuffs are abundant. There is considerable variation in texture and hardness, but much of it is suitable for rough work such as bridges, walls, and rubble construction. Wooden and iron bridges throughout Napa County have gradually been replaced by stone. The same liberal policy is also maintained by the county in road construction and repairs; so that it is a pleasure to ride or drive over its well-kept roads with their picturesque stone bridges (see photos Nos. 35 and 43). The rock is taken from the quarry nearest to the point where it is to be utilized. Napa County is more fortunately situated than many other counties of the State in thus having close at hand an abundant supply of stone suitable for such purposes. Even where stone work is more expensive than in this county, it would still be economical in the long run as it makes a more permanent structure as well as picturesque, when compared to wood or even steel.

Sandstone is found in the ridges surrounding Berryessa, Pope and Wooden valleys, which are east of the main Napa Valley.

Bachelder Quarry, C. S. Bachelder, Napa, owner. It is on the eastern edge of the city, at an elevation of 100 feet (U. S. G. S.), and $\frac{3}{4}$ mile from tidewater. The rock is a reddish rhyolite, in part compact, fine-grained, felsitic, and in portions of the deposit partly altered by devitrification and leaching. The quarry was opened up in 1908. The crushing and screening equipment, driven by gasoline engine, has a capacity for handling 125 tons per nine-hour day. No rock was taken out in 1913. The product is used for road and concrete work.

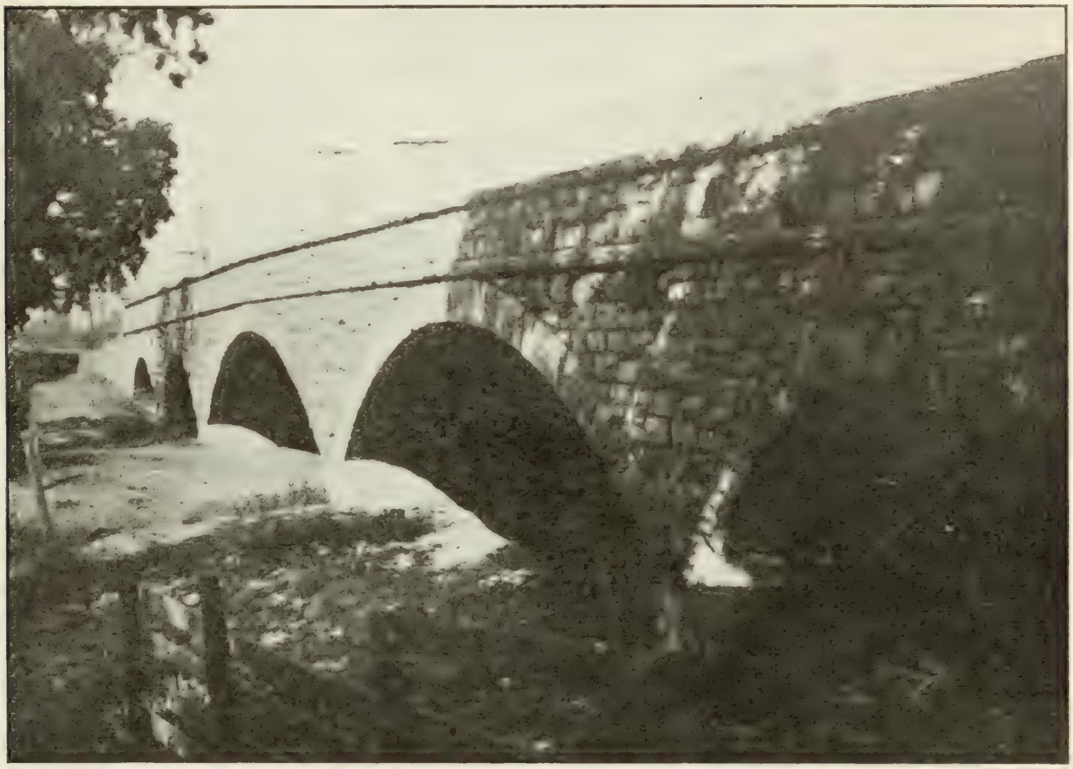


Photo No. 35. "Little Trancas" bridge, near Napa, Napa County. Stone from Wing Quarry, 1908.

Bieber Quarry, P. P. Bieber, St. Helena, owner. It is 1 mile northwest from St. Helena post office and $\frac{1}{4}$ mile from the county road, at an elevation of about 500 feet. The rock is basalt and was first quarried in 1911 under lease, for paving blocks. Not operated in 1913.

Brown Quarry, Mrs. M. Myers, Fairfield, owner. It is 2 miles southeast of Calistoga, and was originally part of the Nettie Brown ranch. The stone is trachytic tuff and has been used locally for building purposes. No production has been made for several years past.

Bibl.: Bull. 38, p. 155.

Buck Ranch. Rock for county road work was quarried from the Buck ranch, southwest of Napa, in 1911.

Carver Quarry (see *Jursch*).

Connors Quarry or "Cement Rock Pit," N. Connors, Calistoga, owner. It is in the western part of Calistoga, on the side of a hill running southeasterly. The material is a tough, clay-like in part, volcanic ash or tuff, and has been used locally for a number of years as a road dressing. It is said to pack quite hard after wetting.

Davis Quarry, Dr. C. E. Davis, St. Helena, owner. On the Davis ranch, 2 miles from St. Helena on the Sanitarium road, is a hard, reddish trachytic tuff which has been used locally for building purposes. At the time of our visit rock was being taken out for the bridge at the north end of Main street, St. Helena. Dr. Davis also owns a deposit of softer stone nearer town on the same road, but no quarrying has been done there.

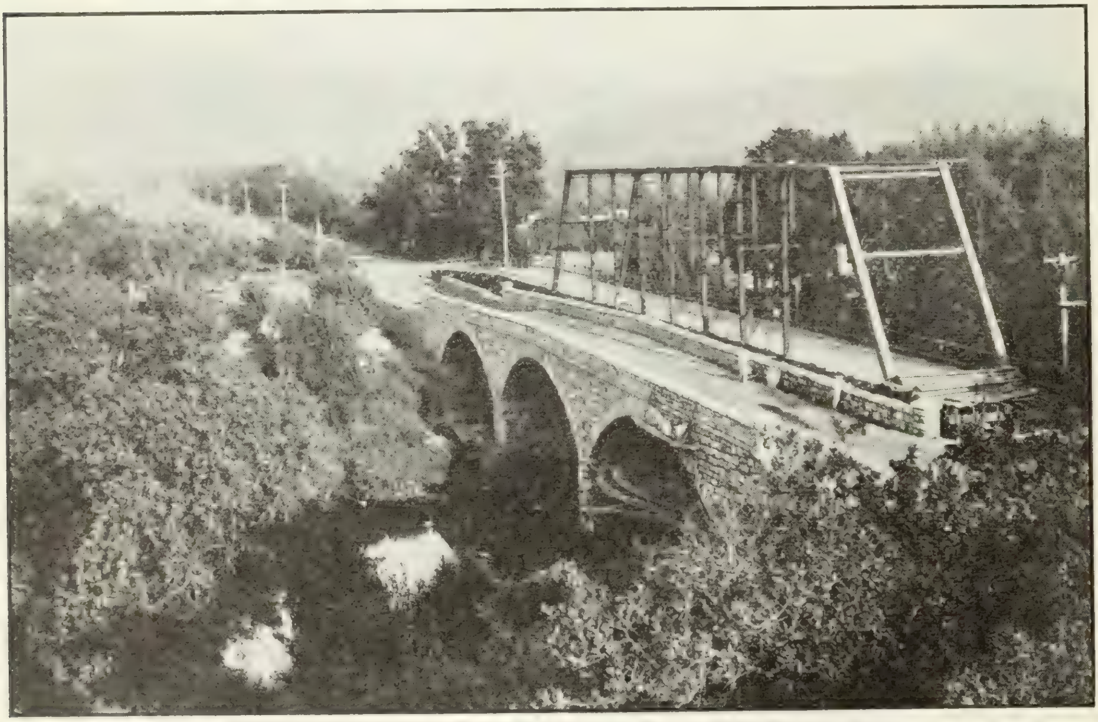


Photo No. 43. "Big Trancas" bridge near Napa, Napa County. Stone from Wing Quarry, 1913.

Bibl.: Bull. 38, p. 155.

Errington Quarry, George E. Errington, Napa, owner. This quarry, about 1 mile east of the railroad station at Napa, produces crushed rock for road metal and concrete work. The crushing plant has a capacity of 100 cubic yards per day, and is driven by a gasoline engine. Four sizes of product are made. It is operated only about six months per year, principally in the summer season. Fourteen men are employed when in full operation. The rock is rhyolite similar to that at the Bachelder quarry, north of this.

Bibl.: Bull. 38, p. 320.

Gardner Quarry, W. G. Gardner, Napa, owner. This sandstone quarry is in Wooden Valley about 10 miles northeast of Napa. The stone is a light buff in color, and fine-grained; and has been used principally for building bridges in the vicinity, though some has also been used for road metal. Idle in 1913.

Bibl.: R. XIII, p. 636; Bull. 38, p. 131.

Harris Ranch. The county has contracted for about 15,000 cubic yards of crushed rock for road work in 1914 to be taken from the Henry Harris ranch southwest of Napa.

Howell Mountain Quarry, H. Overacker, St. Helena, owner. This quarry of trachytic tuff is on the east side of the ridge, elevation 750 feet, on the Glendale ranch, 3 miles northeast of St. Helena. From it, stone of fair-sized dimensions has been taken. Stone from this quarry was employed in the new St. Helena High School building erected in 1912 (see photo No. 32).

Photo No. 32. St. Helena High School. Stone from Howell Mountain Quarry, Napa County, 1912.

Bibl.: R. IX, p. 291; XIII, p. 640; Bull. 38, p. 156.

Jursch Quarry (formerly *Carver*), Mrs. Lovella Priest, Sacramento, owner. This quarry, about 1¼ miles northeast from St. Helena, has been idle several years. The stone is trachytic tuff.

Bibl.: Bull. 38, p. 156.

Lenz Quarry, S. Lenz, St. Helena, owner. It is on the Calistoga road, 2 miles north of St. Helena post office. The rock is basalt, and paving blocks have been made there in the past. It is proposed to put in a crushing plant of 80 cubic yards daily capacity to utilize the spalls and waste from block operations for road work.

Linscott Quarry, L. C. Martin, Calistoga, owner. This quarry, 2 miles southeast of Calistoga, on the St. Helena road, has been idle for about 10 years. The stone is trachytic tuff.

Bibl.: Bull. 38, p. 156.

Manuel Quarry (see *Newman*).

Mee Ranch. A little stone (tuff) has been taken recently from the Mee ranch, 2½ miles from St. Helena on the east side near the creamery.

Moffatt Quarry, Moffatt Estate, owner; B. Bruck, St. Helena, superintendent. It is 2 miles northwest from St. Helena, and has not been worked for several years.

Bibl.: Bull. 38, p. 156.

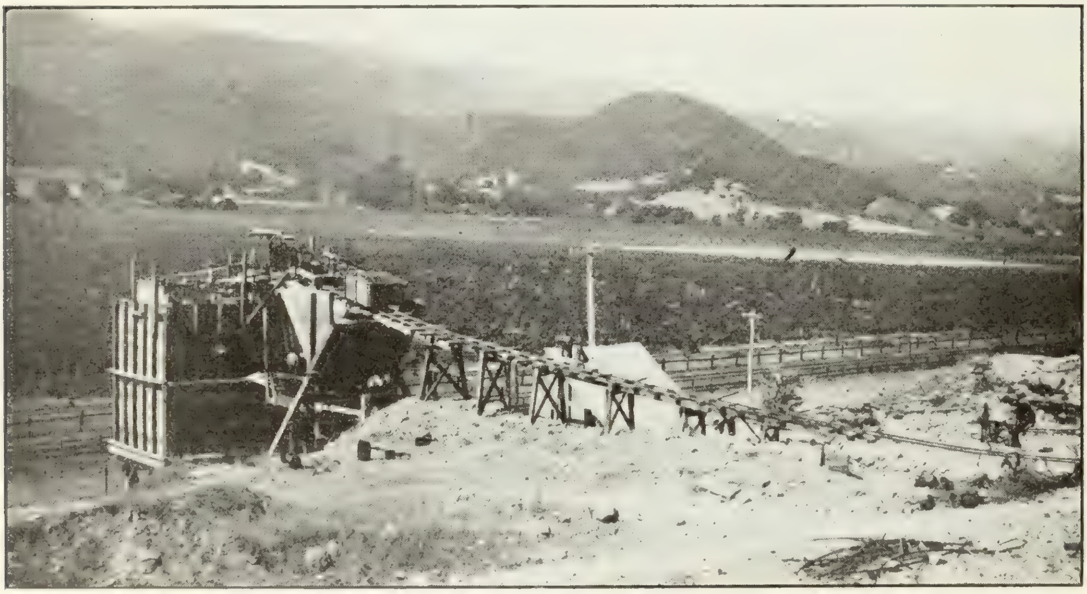


Photo No. 33. Crusher and bins at Napa County Rock Plant, near Yountville.

Napa County Rock Plant. The county owns 3 acres on the hill at the turn of the county road 1 mile northwest from Yountville. The crushing and screening plant is driven by a 20 horsepower electric motor, power being bought from the Napa Valley Electric Railway, whose tracks as well as those of the Southern Pacific Company, are within 100 feet distant (see photo No. 33). The quarry was opened up about 1909, and is worked principally during the summer months. The capacity of the plant is 100 cubic yards per day, and requires 15 men when in full operation. The rock is a somewhat decomposed volcanic. The product is used for road metal in the surrounding district, and is hauled from the plant in wide-tired, bottom-dump wagons holding 6 cubic yards each. These wagons are owned by the county, which pays 50 cents to 65 cents per cubic yard, according to distance, for the hauling, horses being furnished by the drivers. The total cost is stated to be about $1 per cubic yard of rock, laid down at the point of use.

Napa Sandstone Company, J. B. Newman, Napa, owner. This sandstone quarry, in Clark Canyon, west of Napa, was first opened up in 1873. In 1901 and 1902 some stone was quarried for bridge construction and for the Behlow Block, Napa; but none recently. It is suitable only for rough work, and no large pieces are obtainable.

Bibl.: Bull. 38, p. 132.

Newman Quarries (see also *Wing*). J. B. Newman, Napa, owns two quarries of trachytic tuff; one, on the Berryessa road, 5 miles northeast of Napa, and the other back of the state asylum, 3 miles southeast of Napa (the latter formerly known as Manuel). Both are at an elevation of about 700 feet (U. S. G. S.). The stone is only rough, quarry-dressed, as it is coarse and used only for bridges and foundation work. The quarry near the asylum has not been operated recently.

Bibl.: R. X, p. 361; XIII, p. 640; Bull. 38, p. 157.

Olsen Quarry (see *Zollner*).

Phelan Quarry. This sandstone quarry, 4 miles south of Monticello on the west side of Berryessa Valley, has been idle for several years.

Bibl.: Bull. 38, p. 132.

Pickett Quarry, C. N. Pickett, Calistoga, owner. No stone (tuff) has been taken from this quarry for about 10 years past. It is 1¼ miles east of Calistoga.

Bibl.: Bull. 38, p. 157.

Rose Quarry, D. C. Willis, Calistoga, agent. This was originally a part of the Brown ranch. It has been idle for about ten years past. The stone is trachytic tuff.

Bibl.: Bull. 38, p. 157.

Salmina Quarry. Matilda Wilson, Napa, owner. It is 7 miles north of Napa, and has not been operated recently. The stone is trachytic tuff.

Bibl.: R. XIII, p. 640; Bull. 38, p. 157.

Southern Pacific Company Gravel Pit. The Southern Pacific Railroad Company has six acres in the creek bed at the south end of Main street, St. Helena, and adjoining the Watt gravel pit. A spur track connects with the main line. The material is utilized for ballast, but none was taken out during the year 1913.

Tychson Quarry. Mrs. J. Tychson, St. Helena, owner. On the Tychson place, 2 miles northwest of St. Helena on the Calistoga road, a paving-block quarry was opened up in 1911. The rock is a fine-grained, bluish basalt. The spalls and waste will be utilized for crushed rock for road work around St. Helena, under contract awarded by the county supervisors in September, 1913.

Watt Gravel Pit. Miss Margaret Watt, St. Helena, owner. About eight acres of this property at the south end of Main street, St. Helena, is in the creek bed and available for recovery of gravel. The balance is in orchard. Operations were begun in 1908, and the excavations show the gravel bed to be 6 to 10 feet in depth to the clay below. The major portion of the material sold is taken for ballast by the Napa Valley Electric Railway, which has a spur track into the pit. It is also used locally for street and road work. Those taking out the gravel employ their own labor, and pay a certain price per wagon or car load for the gravel removed.

Williams. There is a small quarry on the Williams place north of Calistoga.

Wing Quarry (Newman). H. W. Wing, Napa, owner. The Wing and the Newman quarries, adjoining, on the Berryessa road about 6 miles northeast of Napa, were originally one, owned by Newman & Wing. This quarry was first opened up in 1878. Elevation, 600 feet. The stone is a light, yellowish to gray, trachytic tuff, showing flow structure, so that, at a little distance, in part it resembles bedded sandstone strata. The stone here is of better quality, harder and more compact than the average of the tuff used in Napa County for buildings and bridges. The ''Little Trancas'' (Milliken Creek, U. S. G. S.) and the ''Big Trancas'' (Napa River, U. S. G. S.) bridges, north of Napa City were constructed of stone from the Wing quarry, the latter of which was just being finished when visited in September, 1913 (see photos Nos. 35 and 43). This bridge required 75,000 cubic feet of stone, and the average cost was stated to be 27 cents per cubic foot as laid in cement mortar.

Bibl.: R. XIII, p. 640; Bull. 38, p. 158.

Zollner Quarry (formerly *Olsen*). Estate of J. F. Zollner, owner. It is 2¾ miles south of Napa, and has both basalt and a hard gray trachyte, the former of which has been utilized for paving blocks. Idle in 1913.

Bibl.: R. XIII, p. 633; Bull. 38, pp. 158, 320, 342.

In addition to the above quarries, the following occurrences of stone have been noted, though as yet they are undeveloped:

There is *sandstone* in Maxwell Canyon, Pope Valley, 15 miles north of Rutherford, on the Maxwell and Hardin ranches; also in Gordon Valley, 11 miles east of Napa.

There is columnar *basalt* in Clark's Canyon, 12 miles west of Napa. Charles Clark, Napa, owner; also on the east slope of Mt. St. Helena, 6 miles west of Kellogg.

There is *steatite* and *serpentine* in Chiles Valley, northeast of Rutherford. There is a specimen of steatite (soapstone) in the museum of the State Mining Bureau, from the Fir Hill ranch, 2 miles west of Chiles post office.

About ½ mile west of the Corona quicksilver mine, northeast of Calistoga, is a body of light colored volcanic tuff, some of which was quarried for building purposes at the Corona. It did not weather well, as it was too soft.

Bibl.: R. V, p. 107; XII, p. 399; XIII, pp. 612, 639; Bull. 38, p. 131.

VOLCANIC ASH.

Under the name of "Callustro," and sold for use as a polishing powder, a deposit of volcanic ash about 3 miles west of Calistoga was exploited some years ago. There was a small mill on the property, for grinding and screening the material, but it has been idle since 1898. W. C. Sharpstein is the present owner.

Bibl.: R. X, p. 362.

SOLANO COUNTY.

Field Work in September, 1913.

Solano, one of the "north of the bay" counties, is surrounded by Yolo County on the north, on the east Yolo and Sacramento, on the south Sacramento and Contra Costa, and on the west by Napa. San Pablo and Suisun bays and the Sacramento River are on its south, the latter forming also a portion of its eastern boundary, while Putah Creek defines a part of the northern line. The total area of the county is 900 square miles, of which 822 square miles represents the land surface. It is about 35 miles north and south by 45 miles extreme width east and west. The main drainage system of the county is tributary to the Sacramento River, and a portion to the bays. Only the western section of the county has contributed to its mineral output, as Solano's principal resources are agricultural. Her mineral products in the order of their production to date are: cement, stone industry, quicksilver, mineral water, lime and limestone, brick, natural gas, salt and fuller's earth. Solano first entered the producing column in 1860 with a natural hydraulic cement from Benicia, followed in 1873 by the operation of the St. Johns quicksilver mine, which remained an important factor for seven years. By far the most important development, however, has been the most recent one, *i. e.,* Portland cement, which began in 1900.

As will be noted from the table, the total production for the county, to the end of 1913, has been $17,205,665.

ARAGONITE (see Onyx Marble).

BITUMINOUS ROCK.

(See Vulcan Rock Quarry under Stone Industry).

BRICK AND CLAY.

High Fire-Pressed Brick Company (see Houze).

Houze Brick and Cement Company. This property, which has been variously known under the names of: High Fire Pressed Brick Company, Pressed Brick and Supply Company, Vallejo Hydraulic Pressed Brick Company, and the Houze Brick and Cement Company, is about 2 miles north of Vallejo and adjoins the Vallejo Brick and Tile Company on the south. Christian Hoffmann, of Santa Cruz, is the present owner. Its area is 52 acres, and the plant includes a Hoffmann furnace of 10,000 per day capacity. It has been idle since 1909.

Bibl.: R. XIII, p. 619; Bull. 38, p. 258.

Vallejo Brick and Tile Company, Consolidated. J. F. C. Hagens, 343 Sansome street, San Francisco, manager. This plant is 2 miles north of

SOLANO COUNTY—Table of Mineral Production.

Year	Quicksilver		Mineral water		Lime and limestone		Stone industry. Value	Natural gas. Value	Miscellaneous and unapportioned	
	Flasks	Value	Gallons	Value	Tons	Value			Kind	Value
1873	1,800	$144,594								
1874	1,900	199,842								
1875	2,100	176,715								
1876	1,683	74,052								
1877	1,463	54,570								
1878	802	26,386								
1879	1,290	38,507								
1880	492	15,252								
1881										
1882										
1883										
1884										
1885										
1886										
1887										
1888										
1889										
1890										
1891										
1892										
1893										
1894					6,400	$8,000	$225			
1895					4,300	4,635	19,650			
1896			3,094	$1,547	5,477	5,989	15,752		75 tons pottery	$125
1897					9,608	9,801	20,975		400 tons pottery	500
1898					6,125	5,570	15,065			
1899			20,000	4,000		356	12,581			
1900			20,000	4,000	1,800	1,800	18,900			
1901			17,800	4,450		5,950	2,200			
1902	42	1,890	10,000	4,000			14,250		75,000 barrels cement	150,000
1903	100	4,100	10,000	4,000			21,514		250,000 barrels cement	375,000
1904	*377	15,080	10,000	4,000			11,113			
1905	542	18,518	10,000	4,000	100,000	100,000	78,573			
1906	528	19,272	4,000	4,000			143,487			
1907	640	24,422	40,000	4,000			202,146	$6,584	125 tons salt 3,000 M brick	600 25,000
1908	764	33,294	140,000	11,600			527,319	8,053	400 tons salt 1,000 M brick	2,800 7,000
1909			32,650	5,490			176,813	7,538	100 tons salt 1,600 M brick 5,600 tons clay	200 20,000 11,200
1910			32,400	3,960			241,949	9,100	50 tons salt	150
1911			30,000	4,000			181,952	8,596	100 tons salt 500 M brick	300 4,000
1912			285,050	44,000			139,445	8,528	50 tons salt 2,200 M brick	100 20,000
1913			23,600	3,440			28,915	7,336	Unapportioned, 1900–1913, inclusive	13,570,019
Totals	14,523	$846,494	688,594	$110,487		$142,101	$1,863,824	$55,765		$14,186,994

*Flasks of 75 pounds since June, 1904; 76½ pounds previously.

Totals.

Quicksilver	$846,494
Mineral water	110,487
Lime and limestone	142,101
Stone industry	1,863,824
Natural gas	55,765
Miscellaneous and unapportioned	14,186,994
Total to end of 1913	$17,205,665

west from Vallejo post office, at tide water on the north waterfront. Rail connections are 2 miles distant. Operations began in 1909, and except for four months in winter were continuous up to the latter part of September, 1913, when the plant was closed as the result of a combination of circumstances, the principal ones being lack of water and labor difficulties. Water was obtained from the Vallejo city mains and cost $75 to $100 per month. The equipment includes one 16-chamber kiln (40,000 capacity per chamber; heated at four corners of each chamber; down-draft, oil fired); one round down-draft kiln 30 feet diameter; two dry pans (capacity 25,000 per day each); one pug mill; one brick machine; one automatic cutting table (capacity 50,000 per nine hours); two represses; one dry press (20,000 capacity per day). Steam power used with oil as fuel.

Photo No. 62. Pacific Portland Cement Company, Cement, Solano County. General view from south of old and new mills.

The following analysis of yellow shale from the company's clay beds was made by J. F. Pfleuger & Company, Bremen, Germany:

Loss on ignition (moisture and carbonic acid)	8.03%
Silica	57.83%
Alumina	19.52%
Iron oxides	7.46%
Calcium oxides	1.24%
Magnesium oxides	2.06%
Alkalies (balance)	3.86%
	100.00%

Trial runs have shown that a good vitrified brick for paving purposes can be made from this shale.

In addition to the above named plants there were at one time two others: McKenzy & Reid's pottery at Benicia, which used clay from Ione (Amador County) and from Hoyt's farm near Goodyear Station; and the Union Pressed Brick and Terra Cotta Company, with six kilns at Vallejo. These have both been abandoned for a number of years.

Bibl.: R. VIII, p. 631; XIII, p. 619; Bull. 38, p. 258.

CEMENT.

Benicia Works. This property, at Benicia, owned by Jas. Clyne, has not been operated of recent years, but previous to the rise of the Portland cement industry in California was an important producer.

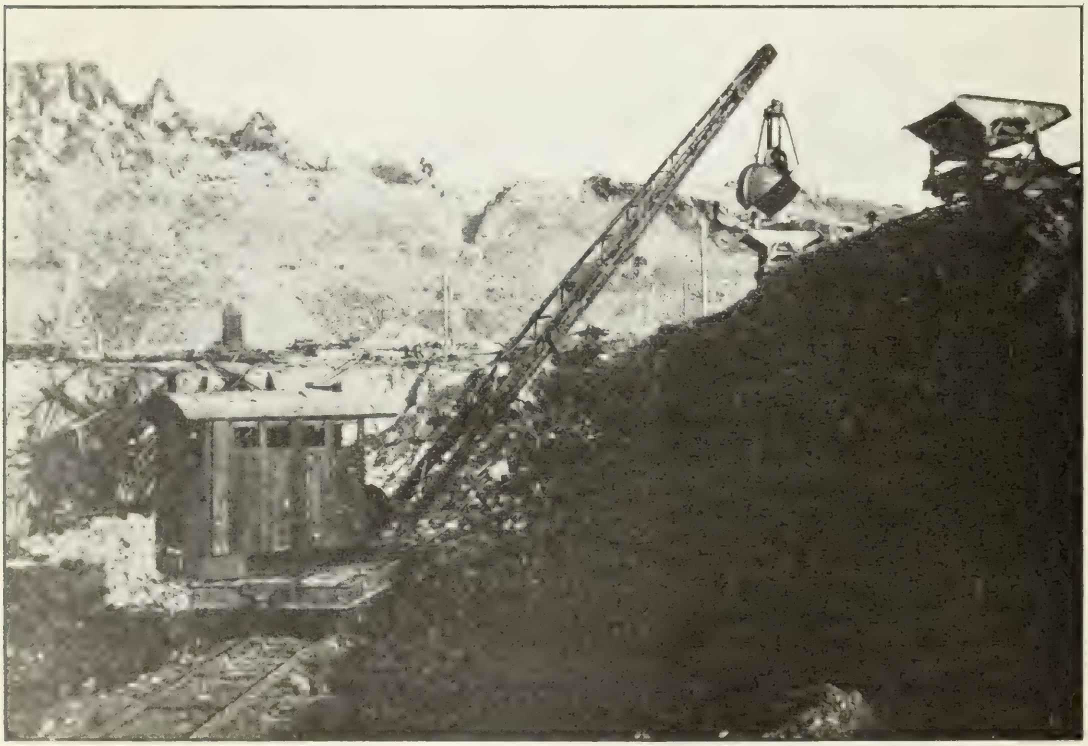


Photo No. 63. Orange-peel bucket excavator in quarry of Pacific Portland Cement Company, Solano County.

The product is a "hydraulic limestone" or natural cement and was first put on the market in 1860.

Bibl.: R. VIII, p. 632; IX, p. 309; XII, p. 380; XIII, p. 612; Bull. 38, p. 185; Min. Res. W. of Rocky Mts., 1868, p. 245; Geol. Surv. of Cal., Geol. Vol. I, p. 101.

Pacific Portland Cement Company, Consolidated. F. G. Drum, president; F. E. Erline, secretary; home office, 832 Pacific Building, San Francisco. F. D. Wood, superintendent at the plant. This plant at Cement, northeast of Fairfield, is in two units, as will be noted from the photograph (No. 62), the new one being on the right, with capacities of 2500 barrels and 3500 barrels per day respectively. The older plant began operations in 1900, and was enlarged in 1903 and 1905, while the new plant has been producing since 1907.

The original source of both their limestone and clay, and from which a portion of the supply is still drawn, was the hill immediately above the works. The limestone here was a series of travertine or tufa deposits from calcareous springs, and largely superficial. They formed terraces and cascades on the southwestern slopes of the hill, similar to the terraced deposits which may be seen forming at the present time in the Yellowstone Park, Wyoming. In the quarry at the top of the hill the limestone was found more massive and to a greater depth, but over only a limited area. Fossils have been found in this travertine and also in the clay beds nearby; the latter have been identified by the Department of Palaeontology, University of California, as "*Inoceramus* cf. *Whitneyi.*" The old low-grade dumps are now being reclaimed and sent to the mill along with the fresh material from the quarry. A Hayward orange-peel excavator (photo No. 63) is used to load the material. The so-called "Suisun marble" (see under Onyx Marble) was at one time quarried from this travertine, and for a number of years previous to the establishment of cement-making here it was a source of both lime and limestone production. The remains of the old lime kiln on the Dickey ranch, part of the property, are still

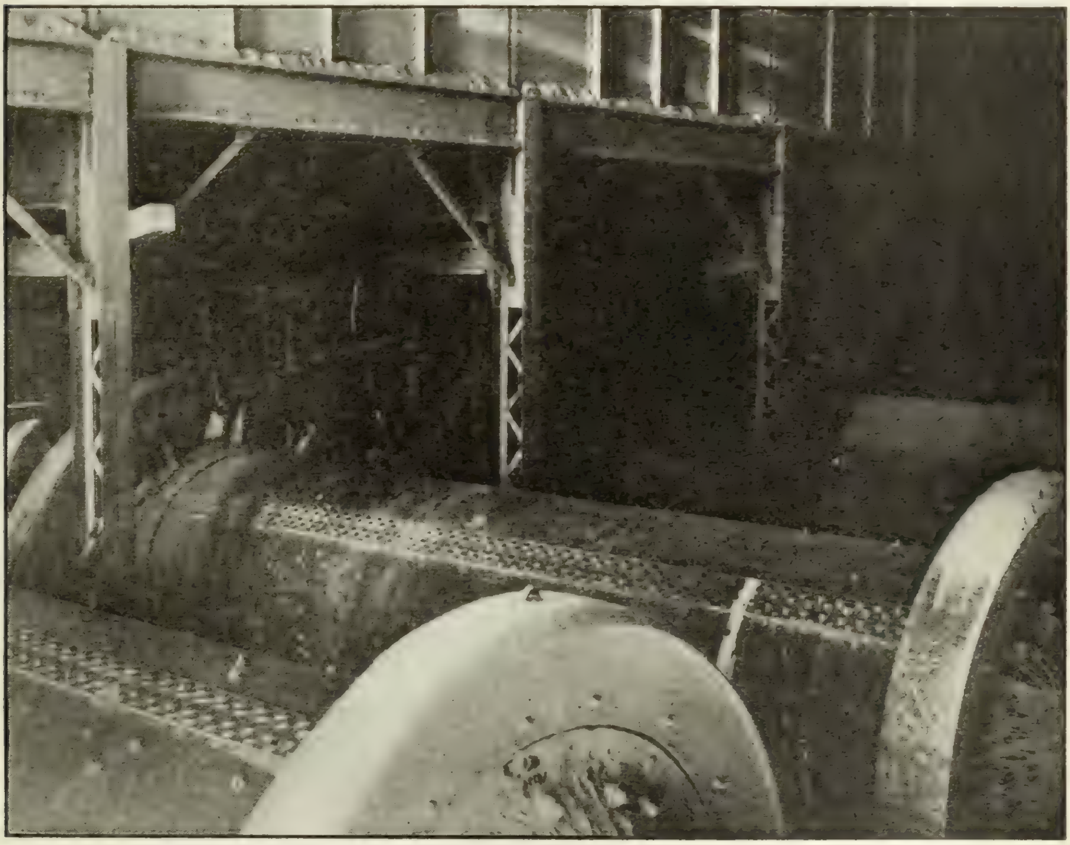


Photo No. 67. Tube mills and hoppers, for crushing raw materials in new mill of Pacific Portland Cement Company, Solano County.

to be seen. Shipments were made to the Selby smelter for fluxing purposes. It was also used as macadam. As the limestone in these deposits has diminished both in quantity and quality, the charge is sweetened by the addition of a clean lime rock from the "Great Crevice," owned by the company, at Murderer's Bar on the American River, 9 miles from Auburn, Placer County. They have their own railroad connecting the quarry with the Southern Pacific at Flint Station, and ship 1200 to 1500 tons of rock per day. The principal clay supply is at present obtained from the flat below the mills, using a steam shovel. The clay beds are 40 feet in depth. The clay layers on the hill, which stand more or less vertical, are interstratified with a shaly sandstone.

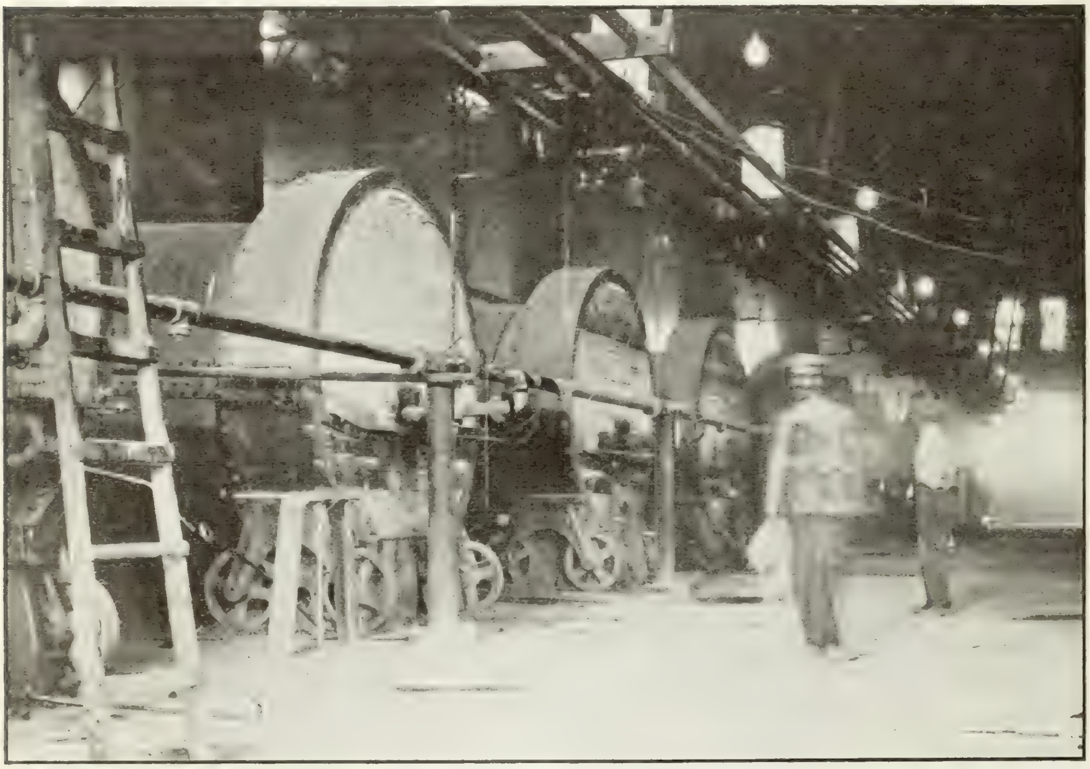


Photo No. 69. Rotary kilns in new mill of Pacific Portland Cement Company, Solano County.

In the older mill the lime rock and clay are dumped into separate bins, then weighed and carried by trolley car to the driers. The mixture is made of the coarse materials before drying. In the new plant the mixture is made with the dried ground materials between the ball and the tube mills, the limestone content being maintained at 76 per cent $CaCO_3$, before clinkering. This new unit embodies a number of improvements as compared with the older one, not only in the arrangement of the plant itself, but also in the addition and functions of new appliances and machinery.

There are cement-lined tunnels running under the mill, which contain the oil, water and sewer pipes, the power cables and some of the electrical machinery. This makes them easy of access and also free from the excessive dust of the plant.

Just above the mill there are eighteen circular steel bins holding about 100 tons each, which are used for limestone and clay storage. Each bin is sampled so that the quality of its contents is known before being drawn off into the mill. Following the ball mills are eight Berquist bins of 100 tons capacity each—four each for lime and clay—which are used for a reserve before the mix. The materials are automatically weighed and dumped into a double-screw mixing machine, delivering to an elevator which serves the individual bins for the tube-mill feed.

Photo No. 72. Solano County Jail at Fairfield. Built with "Golden Gate" cement.

The tube mills are 5′ 6″ x 22′, trunnion type (see photo No. 67). Photo No. 69 shows the discharge and fire-box end of a battery of rotary kilns in the new unit. They are using for kiln linings a brick made up of clinker and cement with a small percentage of fire clay. A temperature of 2700° F. is attained in the kilns. They are set on a grade of $\frac{3}{4}$-inch per foot. Crude oil, topped, of 16° B. gravity and 17,000 B. T. U. is used for fuel at the rotary kilns. The oil is shipped in barges via Suisun Slough to Fairfield, whence it is pumped to a tank on the hill above the plant at Cement, a distance of about 5 miles.

The discharged clinker is sprayed with water and handled by McCaslin conveyors to the rotary coolers. These coolers are like an open-ended tube mill, with longitudinal baffle plates, and a current of cold air is drawn through them. When sending the clinker to the storage pile in place of the ball mills, instead of going to the rotary coolers it is put through cooling towers similar to those described in the plant of the Standard Portland Cement Company at Napa Junction (see under Napa County). Gypsum, 2 to 2½ per cent, is added to the clinker before grinding. The tube mills designedly do not grind the product in a single stage to its desired ultimate fineness. The discharge goes to an "Emerick Air Separator." This consists of a series of horizontal revolving discs, from which the fines are drawn up by suction to the stock house, and the coarse particles which work to the periphery of the discs are returned to the mills.

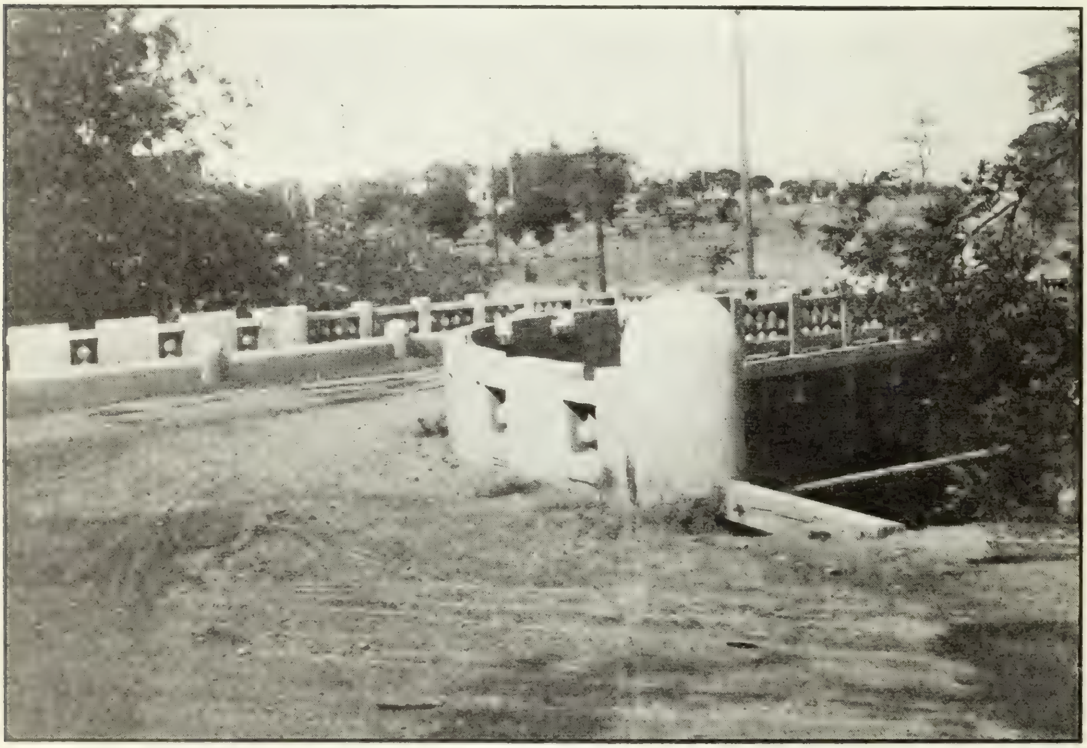


Photo No. 76. Concrete Bridge at Vacaville, Solano County (1911).

In the stock house automatic sacking machines are used and a belt conveyor takes the filled sacks of "Golden Gate Brand" cement to the waiting railroad cars alongside. The Solano County jail at Fairfield (see photo No. 72) is of reinforced concrete, in which Golden Gate cement was used. The Cement, Tolenas and Tidewater Railroad, owned by the company, connects Cement with Tolenas Station on the main line of the Southern Pacific, 2 miles to the south.

A large and well equipped laboratory is maintained for chemical analyses and physical testing. It is supplied with natural gas from the well of the Rochester Oil Company, 5 miles southeast of Cement. Included in the equipment of the two mills are 250 electric motors, varying from 580 h.p. down to 1 h.p., and there are eight 6′ x 60′, eleven 7′ x 80′, and one 8′ x 100′ rotary kilns. From 6000 to 7000 h.p. per day are consumed, and about 500 men are employed. The water supply comes from wells—one at the works and others at Vacaville, where the company has a pumping plant.

(For a more detailed description of the general process of cement manufacture, see Cement under Napa County.)

Bibl.: R. X, p. 670; XII, p. 395; XIII, p. 632; Bull. 38, pp. 185–189; Geol. Survey of Cal., Geol. Vol. I, p. 104; U. S. G. S., Bull. 243, p. 120; Bull. 522, pp. 118, 121.

CHROMITE.

Chromite is reported to occur near Fairfield. There is a specimen in the museum of the State Mining Bureau, said to have come from that locality, but the deposit is undeveloped.

Bibl.: R. IV, p. 137; VI, Pt. I, p. 101; VIII, p. 632; Bull. 38, p. 363.

COAL.

Lignite is reported as occurring in the southwestern part of the county, but no development work has been done.

Bibl.: R. VI, Pt. I, p. 118; VII, p. 151; Geol. Surv. of Cal., Geol. Vol. I, p. 106.

FULLER'S EARTH.

Western Fuller's Earth Company (Joice ranch). This is on the Joice ranch, ½ mile northeast from the railroad station at Vacaville. Mrs. Clara I. Hopkins, Fairfield, and the Joice Estate, owners. The deposit consists of a series of bedded strata in a low rounded ridge about ½ mile in length, strike northwest and dip about 40° E. Elevation 200 feet (U. S. G. S.). The open cut has exposed these strata for a thickness of over 30 feet. The color varies from white to light brown. There is no plant, the material being simply sacked as broken out, and shipped.

The typical fuller's earth is a non-plastic clay, which falls to pieces easily in water, and which has a strong affinity for grease in cloth and coloring matter in oils. While it is now well understood that chemical analyses are no criterion in determining whether or not a particular clay should be classified as "fuller's earth," this Vacaville material is not a clay, but "Monterey shale." It has a slight clay odor and adheres to the tongue, but does not break down readily in water. Under the microscope it is seen to be a fine, angular volcanic ash, with an occasional circular diatom. But the practical test is a physical one—whether or not it will do the work of a fuller's earth. The Vacaville earth answers this specification. Charles L. Parsons (U. S. Bureau of Mines, Bull. 71, Mineral Technology No. 3, on "Fuller's Earth," 1913, p. 24), in a table giving "Bleaching Tests of Fuller's Earth" on cottonseed oil, indicates that the Vacaville earth gave only a slight reduction in color, and notes: "Indeed, as regards edible oils, several of these clays should not be classified as fuller's earth at all." In "Mineral Resources of the U. S., 1912," Vol. II, p. 1020, it states: "California had only two producers of fuller's earth in 1912—the Eight Oil Company at Bakersfield, and the Western Fuller's Earth Company at Vacaville. The fuller's earth in California is reported as having been used in refining animal fats and vegetable oils."

In verification of this latter statement, the packing-house of the Western Meat Company, at South San Francisco, was visited recently by the writer. This company is using a considerable tonnage of both English earth and the Vacaville variety, the latter giving nearly as good results as the standard English fuller's earth. M. J. Levy, the company's chemist, in my presence, made a comparative bleaching test on "prime summer yellow cottonsed oil," using the English and Vacaville materials (through 100-mesh screen). Identical 300-gram samples of the oil were heated to 216° F., 21 grams of the earths severally added, and agitated for three minutes, then filtered and the colors compared with the Lovibond color scale. To the unaided eye the difference in color was but slightly noticeable. The figures were as follows:

	Yellow	Red
Unbleached oil	35	6.0
Through English earth	20	2.3
Through Vacaville earth	20	2.8

The following figures are the result of a series of similar tests made by Levy, October 28, 1912 (samples through 100-mesh screen, except as noted):

	Yellow	Red
English	20	2.1
Florida	20	2.2
Vacaville	20	2.6
Vacaville (floated)	20	2.7
Bakersfield	20	3.4

In bleaching edible oils, a given charge of fuller's earth is used but once—5% to 10% of the weight of the oil to be bleached being the amount of earth taken. The oil is heated to a little above that of boiling water, the earth added and the mixture agitated three or four minutes, then filter-pressed.

With mineral oils the earth (through 15 to 80 mesh) is charged into a tall cylinder about 15 feet in height and the oil is allowed to percolate through this. The oil may or may not be heated before filtering, depending on its viscosity. A given charge of earth may be used ten to sixteen times. After blowing out the percolator with air, then washing with naphtha, and finally blowing out with steam, the fuller's earth is revivified by heating to a dull red heat in a rotary kiln similar (but smaller) to those used in Portland cement manufacture. In pursuance of experiments for a thesis in the Department of Mineralogy and Geology, University of California, in 1912, one of the students found that samples of Monterey shale, from a certain locality in Santa Cruz County, ''possessed the properties of a first class fuller's earth.'' A sample of similar material from Pinole, Contra Costa County, gave similar results. These tests were made with mineral oil, a ''heavy distillate S. G. O. 95, black in color.'' No mention is made of having tested samples of the Vacaville material, so it would seem worthy of investigation to determine its suitability for decolorizing petroleum.

Bibl.: Bull. 38, p. 273; U. S. G. S., Bull. 315, pp. 268, 290; Bull. 365 and 475; Min. Res. 1907, 1911, 1912; U. S. Bur. of Min., Bull. 71.

LIME AND LIMESTONE.

As has been noted under ''Cement'' the travertine deposits on the A. A. Dickey ranch, now owned by the Pacific Portland Cement Company, were at one time quarried, and the material calcined for lime. There are similar deposits, but smaller in extent, at Tolenas Springs (see under ''Onyx Marble,'' also ''Mineral Water''). The ''hydraulic limestone'' at Benicia has been mentioned under ''Cement.''

Bibl.: R. VIII, p. 631; X, pp. 669, 670; XII, p. 632; Bull. 38, p. 61.

MARBLE (see Onyx Marble).

MINERAL WATER.

Tolenas Springs. Donald Lamont et al., San Francisco, owners; H. W. Conkle, box 63, Suisun, lessee. The springs are at the head of Soda Springs Creek, 5½ miles north of Fairfield, at an elevation of 800 feet (U. S. G. S.). The following temperatures were noted: Tolenas 66° F.; spring at aragonite deposit on road below house, 76° F. There was much gas escaping from this latter spring, and it was surrounded by a considerable deposit of calcareous sinter. Water from the former is bottled for sale. It has a noticeable salty taste from the sodium chloride it carries—216 grains per gallon. The escaping gas (CO_2) is caught in a gasometer and pumped into the water in bottling. There are no accommodations for guests. There is also a white sulphur spring about ¼ mile below. Some years ago this "onyx marble," or aragonite, was quarried and sold as "Tolenas onyx," but there was too small a body of it. Some beautifully banded pieces could be obtained, but not in sufficient size. There are several of these deposits around the springs and in the near-by hills.

Bibl.: R. VI, Pt. I, p. 74, X, pp. 668, 670; XII, p. 346; XIII, p. 521; Bull. 24, p. 138; U. S. G. S., Bull. 32, p. 209; Water Sup. Pap. 338, pp. 162–163; "MINERAL SPRINGS AND HEALTH RESORTS OF CAL.," W. Anderson, p. 255.

Vallejo White Sulphur Springs (also known as White Sulphur and Vallejo Sulphur Springs). Manuel Madrid, Vallejo, owner. They are in Sec. 10, T. 3 N., R. 3 W., 5 miles northeast of Vallejo, elevation 400 feet (U. S. G. S.), at the head of Sulphur Springs Creek. The springs are at the foot of the sharp ridge of rocks known as Sulphur Springs Mountain. The main spring is stated to have an average flow of about 100,000 gallons per twenty-four hours. The temperatures are: Blue Rock, 67° F.; Small Sulphur, 69.5°, Big Sulphur, 68°. Water from the first named is bottled. There are accommodations for 100 guests.

Bibl.: R. XII, p. 347; XIII, p. 520; U. S. G. S., Bull. 32, p. 209; Water Sup. Pap. 338, p. 255; W. ANDERSON (op. cit.), p. 260.

NATURAL GAS.

Rochester Oil Company (formerly Hurley's ranch). J. R. Chadbourne, president; Geo. Trainor, secretary, Suisun. The well is on land owned by J. L. Freitas, and leased to the company, in Sec. 24, T. 5 N., R. 1 W., 8 miles north of east from Suisun and 6½ miles south of Elmira; elevation 50 feet. The well was drilled in 1901 for oil because of a seepage near-by. Gas was struck at a depth of 1520 feet. They drilled on to 1820 feet, but nothing further was obtained and the well was abandoned for three years. Four other holes were drilled without result. Salt water comes up with the gas (see under Salt) The flow of gas is stated to be about 20,000 cubic feet per day, and it is distributed by its own pressure through pipes to Suisun, Fairfield and Cement. There is a gasometer of about 20,000 cubic feet capacity at the well. We were informed by the chemist at the cement works that it is an efficient gas but contains considerable moisture.

In addition to the above, the following occurrences of natural gas are noted:

M. Allen Ranch in Sec. 2, T. 4 N., R. 1 W., used for domestic purposes by the owner.

Hilborn Bros. Well in an "anticlinal valley," in the Potrero Hills, in the northern part of T. 4 N., R. 1 W. Not utilized.

L. A. Lambrecht Ranch in Sec. 12, T. 4 N., R. 1 W., used by owner for domestic purposes. This one and the Allen well are in the marsh land at the edge of tidewater, while that of the Rochester Oil Company is on the low flat land just above the marshes.

Bibl.: R. VIII, p. 185; X. pp. 659, 660; XIII, p. 569; Bull 3, p. 5.

ONYX MARBLE.

Under the name of "Suisun marble" some stone was at one time quarried from the travertine deposits on the Dickey ranch, now owned by the Pacific Portland Cement Company, near Suisun. Some pieces showing a beautifully banded and wavy structure were obtained, but for the most part stone of only small dimension could be cut out. The same thing is true of the deposits at the Tolenas Springs, 4 miles west of these. Aragonite has also been found at Vacaville.

Bibl.: R. I, p. 17; IV, p. 73; V, p. 67; VI, Pt. I, pp. 22, 91; VIII, p. 631; X, pp. 668–670; XII, p. 403; XIII, pp. 632, 641; Bull. 37, p. 112; Bull. 38, p. 114; GEOL. SURV. OF CAL., Geol. Vol. 1, p. 104; U. S. G. S., Water Sup. Pap. 338, p. 162.

PETROLEUM.

Midas Petroleum Company, C. J. Reeves, secretary; home office, Call Building, San Francisco. This company is drilling for oil on the Ryerson ranch above Glen Cove, southeast of Vallejo. The company has a well equipped plant and drill rig and were down over 300 feet in September, 1913, expecting to go to 2000 feet depth. They claim to have obtained favorable indications and some oil seepage.

Rochester Oil Company (see under Natural Gas).

Vallejo and Napa Gas and Oil Company. Mrs. Jennie Hartzell, president; Wallace Rutherford, Napa, attorney and director. The company has 20 acres back of the cemetery north of Vallejo, where they propose to drill for oil.

QUICKSILVER.

St. John's Mines Company (formerly St. John's Consolidated Quicksilver Mining Company). Clifford B. Dennis, Vallejo, manager, C. F. Colmar, Alaska Commercial Building, San Francisco, secretary. The surface rights are owned by C. M. Wilson, of Los Angeles. The St. John's mine is in Sec. 33, T. 4 N., R. 3 W., 6 miles northeast from Vallejo, with an excellent oiled road to within 1 mile of the furnaces. It is at the northern end of the ridge called Sulphur Springs

Mountain. Its first period of operation was 1873–1880, when it produced a total of 11,530 flasks. The St. John's Consolidated Company reopened the mine in 1899 and continued production up to 1909, since which time only a small amount of development work and occasional retimbering to keep the mine open has been done. Total production to date has been 14,523 flasks of quicksilver.

The country rocks are an indurated shale and metamorphic sandstone, the latter of which is in part quartzite. The ore carries cinnabar with pyrite, marcasite and some quartz, which has been deposited principally along the fissure planes and jointages in both the sandstone and schist. Cinnabar also occurs as an impregnation in the sandstone, resembling the ore of the Oat Hill mine, Napa County, except that here it is harder. A thick, dark brown mineral oil which burns readily when a candle is applied to it, is found in the jointages and fissures in and near the ore bodies.

The shaft is down 400 feet, reaching a depth of about 650 feet vertical, below the outcrop. There are three main levels from the shaft and five intermediates. The main adit is above the furnace level, connecting with the shaft at the 300, and is in over 1100 feet. There are six main stopes in the work of later years, the largest of which is 250 feet long by 20 feet wide and 20 feet high, extending diagonally down through three levels. There are two coarse ore furnaces of 20 tons capacity, and one 24-pipe retort, the former of which it is proposed to replace by a fine-ore furnace with larger capacity.

Since the mine was visited (September, 1913), the newly organized company noted above has taken over the rights and equities of the older company under an option to purchase. Development work will be increased and a furnace built. It is stated that experiments are being made on concentration of the cinnabar by an oil flotation process, with satisfactory results.

Bibl.: R. I, p. 26; VIII, p. 631; X, p. 661; XIII, p. 599; Bull. 20, p. 19; Bull. 27, pp. 93-97; U. S. G. S. Mon. XIII, p. 378; An. Rep. XXI, Pt. VI, p. 278; Min. Res. 1907, 1908, 1909, 1910, 1911, 1912; MIN. RES. WEST OF ROCKY MTS., 1874, p. 20; 1875, pp. 14, 178; 1876, p. 20. MINING AND SCIENTIFIC PRESS, Vol. 109, p. 585.

SALT.

Rochester Oil Company (see also under Natural Gas). J. R. Chadbourne, president, Geo. Trainor, secretary, Suisun. The company has a natural gas well in Sec. 24, T. 5 N., R. 1 W., 8 miles north of east from Suisun. Salt water flows from the well with the gas, and is run out into a shallow basin of about 10 acres in extent and dried by solar evaporation. The basin has a hard-pan bottom and the brine is run in to a depth of 4 to 5 feet in the spring, the salt being gathered in August or September. The excess brine is piped to the slough. After evaporation the top material is thrown up with forks, then hauled in wagons to the bank, where it is piled in cones and afterward sacked. No refining is done. It is sold at $3 per ton at the well, principally for stock salt, pickling, etc.

STONE INDUSTRY.

Benicia Rock Crushing Company (see Vulcan Rock Company).

Cordelia Quarry (see Thomasson).

County Macadam Quarry. F. A. Steiger, Vacaville, owner. It is 1 mile north of Vacaville, and the county at one time obtained crushed rock here for road work, but it has been idle for several years. The rock is basalt. It is stated that there is another and larger body of basalt a short distance north of this one, on the Garnet ranch, but undeveloped.

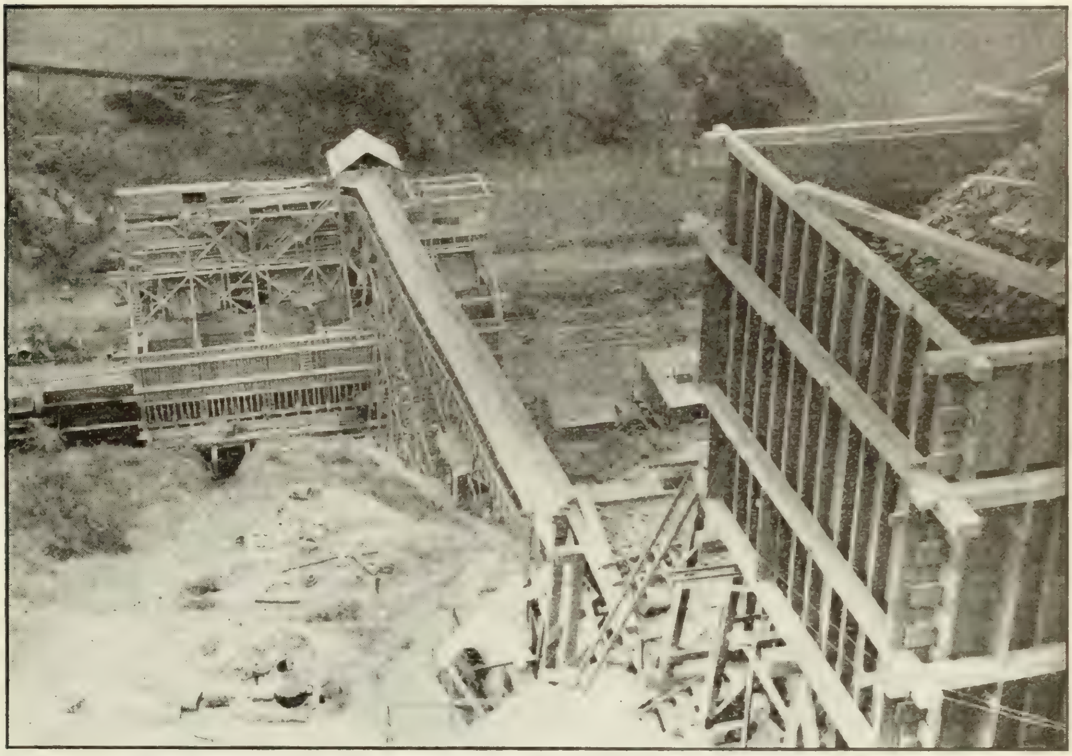


Photo No. 58. Rock Crushing Plant of E. B. & A. L. Stone Company, at Thomasson ("Cordelia" Quarry), Solano County.

McNaughton's Quarry (see Thomasson).

Thomasson Quarry (known locally as the "Cordelia" quarry, also formerly as McNaughton's). E. B. & A. L. Stone Company, owner. E. B. Stone, president, R. P. McDonald, secretary, 401 Phelan Building, San Francisco; T. Griffiths, superintendent at the plant. The quarry is in an isolated hill of basalt at the edge of the marsh land 1 mile east from Cordelia. It is connected by a spur track with the Southern Pacific Railroad at Thomasson Station. The quarry was first opened up about 1875, and for about twenty years produced principally paving blocks, for which the rock is well suited, being a compact, olivine basalt, dark blue to gray in color, with a straight, clean fracture. When visited (September, 1913) there were but three men making blocks, as the market for such is dull, nearly all of the output being as crushed rock for road metal, concrete, etc.

Near the surface the basalt shows in the form of rounded boulders, the result of concentric decomposition. Lower down it is more massive, but oxidized to yellow and gray along fracture planes. In one part of the quarry the stone exhibits the hexagonal jointing (vertical here) common in basaltic masses. In places a vesicular structure is encountered, and at the south end of the hill there is a tuff.

The plant (photo No. 58) is equipped for a daily capacity of about 1000 tons, but the output varies according to the demands of the market and the supply of labor. The product is classified into four sizes by revolving screens. Waste material and dust is taken out through a tunnel below and utilized by the railroad for filling and ballast. The quarrying is done by contract at 25 cents per ton and an output of about 10 tons per man per day is made. Ten quarry faces are at present worked. Electric power is used throughout the plant, the equipment of which includes six motors (200 h.p. largest), one No. 9, two No. 5, one No. 4, and three No. 2 gyratory crushers. Conveyer belts and bucket elevators are used, and there are 12 bunkers with a total capacity of 2000 tons.

The following is the result of a test on road material from this quarry by the Division of Tests, U. S. Department of Agriculture, Bureau of Chemistry, dated February 28, 1905:

Material: Olivine basalt.

Specific gravity	2.78
Weight per cubic foot	174.64 pounds
Water absorbed per cubic foot	0.93 pounds
Per cent of wear	2.27
French coefficient of wear	17.65
Hardness	17.5
Toughness	30
Cementing value	14 dry; 214 wet

"REMARKS—This rock has a fair cementing value when tested dry, but develops a very high value when ground wet. This indicates that plenty of water should be used under the roller when laying the upper course. The resistance to wear is good and the rock should make an excellent road material."

Bibl.: R. X, p. 659; XII, p. 390; XIII, pp. 627, 634; Bull. 38, pp. 325, 342.

P. Siebe has a small quarry opening opposite the station at Cordelia, from which a light-colored tuff has been taken for road dressing, but it has not been worked recently.

Bibl.: Bull. 38, p. 326.

Southern Pacific Railroad Company. The railroad company has a quarry for rock ballast about 3 miles north of Benicia. Worked intermittently.

Vulcan Rock Company (formerly Benicia Rock Crushing Company, also Benicia Crushed Stone Company). Geo. U. Hind, president. Home office, 153 Sutter street, San Francisco. E. F. Rogers, Benicia, superintendent. The company has the quarry rights on the ranch of J. H. Hoyt, 7 miles northeast of Benicia. The shipping point is Hoyt siding, at the crusher, 1 mile north of Goodyear Station on the Southern Pacific. The quarry is on the edge of the range of hills which borders the west side of the Suisun marsh. The rock varies from a blue-black, fine grained basalt, with an occasional feldspar phenocryst, to a tuff. There is some vesicular material, in part oxidized to red. Compressed air drills are used and the rock is hauled in horse-drawn trains to the crusher, which has a daily capacity of 300 tons. Electric power is used, and the product is screened into four sizes: "screenings," to 2½ inches. The waste is run to dumps. Most of the output is used for macadam, but some for concrete. Fifteen to thirty-five men are employed, varying with the demand. This quarry was at one time reported to be producing "bituminous" rock, but the deposit is not bituminous.

Bibl.: R. X, p. 669; XII, p. 390; XIII, p. 627; Bull. 38, p. 325.

In addition to the above there are two small quarries of *tuff* in the northwest corner of the county, owned by Sacket Bros., of Winters, and by D. L. Tucker et al., Winters, respectively. The former extends across Putah Creek north into Yolo County. Also two small *sandstone* quarries northwest of Vacaville, owned by F. Frietas and F. B. Kington, respectively. No stone has been taken from these quarries of recent years.

Bibl.: R. X. p. 791; Bull. 38, pp. 141, 162.

SONOMA COUNTY—Table of Mineral Production.

Year	Quicksilver		Mineral paint		Bricks		Mineral water		Stone industry. Value	Magnesite		Miscellaneous and unapportioned	
	Flasks	Value	Tons	Value	1,000	Value	Gallons	Value		Tons	Value	Kind	Value
1873	50	$4,017											
1874	1,700	178,806											
1875	1,218	102,495											
1876	3,897	171,468											
1877	3,609	134,616											
1878	3,255	106,890											
1879	2,977	88,923											
1880	1,445	44,795											
1881	1,273	37,974											
1882	2,124	59,960											
1883	1,669	47,984											
1884	332	10,126											
1885	446	13,715											
1886	735	26,093											
1887	689	29,196			1,000	$5,000			$350,000				
1888	1,151	48,918			1,000	5,000			367,500				
1889	1,345	60,525							[3]297,236				
1890	1,046	54,915							[1]245,000				
1891	1,660	75,115							[1]150,000				
1892	1,630	66,357							96,000				
1893	1,445	53,104							92,800				
1894	1,368	41,998	100	$3,500	375	1,875			57,381				
1895	1,813	70,707	225	3,375	350	1,750	8,000	$32,500	69,508				
1896	1,126	37,150	220	3,740	250	1,250	14,400	19,287	73,719				
1897	1,538	59,982	270	3,780	[1]300	1,500	236,000	24,000	33,035				
1898	1,704	63,048			350	2,800	246,680	23,490	43,371				
1899	2,119	105,950			200	1,800	21,000	18,500	16,830				
1900	2,209	99,500			280	2,360	575,000	35,000	20,275				
1901	2,130	95,850			150	1,200	60,900	17,691	52,701	175	$1,225	64 tons graphite	$4,460
1902	1,440	64,685	30	105	150	1,200	30,000	9,100	121,578	130	455	42 tons graphite	1,680
1903	2,404	98,676	800	320	160	1,440	10,000	4,000	90,933				
1904	[2]2,700	102,829			175	1,750	11,000	4,400	75,947			1,500 barrels lime	2,250
1905	2,584	97,041			500	4,000	10,000	4,000	213,830				
1906	2,070	75,555			6,800	115,000	10,000	4,000	158,218			Gems	300
1907	560	21,369			11,600	133,479	12,000	4,200	132,946	250	1,250	1,500 barrels lime Gems 10,500 tons clay	2,600 50 10,700
1908	590	24,939			11,000	83,000	10,000	1,000	307,695	15	180	2,600 tons clay	3,000
1909	344	14,226			6,500	29,000	104,000	21,350	319,716			500 tons clay Unapportioned 1900–1909	5,500 15,000
1910	260	11,765					235,000	50,350	220,998				
1911	94	4,325					202,500	50,250	184,035			Unapportioned	1,000
1912	646	27,158					62,500	20,950	295,198	300	3,000		
1913	12	483					96,240	46,910	191,436				
Totals	61,407	$2,533,228	1,645	$14,820	41,140	$393,404	1,955,220	$390,978	$4,277,886	870	$6,110		$46,540

[1] Estimated.
[2] Flasks of 75 pounds since June, 1904. Previously 76½ pounds.
[3] Eleventh Census Report, Vol. X, Part 3, p. 605.

Totals.

Quicksilver	$2,533,228
Mineral paint	14,820
Brick	393,404
Mineral water	390,978
Stone industry	4,277,886
Magnesite	6,110
Miscellaneous and unapportioned	46,540
Total to end of 1913	$7,662,966

County. Steam drying sheds were used. There are five circular brick and pottery kilns (see photo No. 135), which were oil fired.

Bibl.: R. XII, p. 384; Bull. 38, p. 258.

Healdsburg Brick Company. W. Burgett, Healdsburg, owner. Idle since 1906.

Bibl.: Bull. 38, p. 258.

James Henderson on his ranch near Glen Ellen is stated to have small deposits of high grade pottery clay, but they are not utilized.

Pure Clay Brick and Tile Company (formerly Hilton Brick Co.). J. H. Stack et al., 103 Main street, San Francisco, owners. This plant is at Hilton near Guerneville, on the Russian River. No bricks have been burned here since 1912.

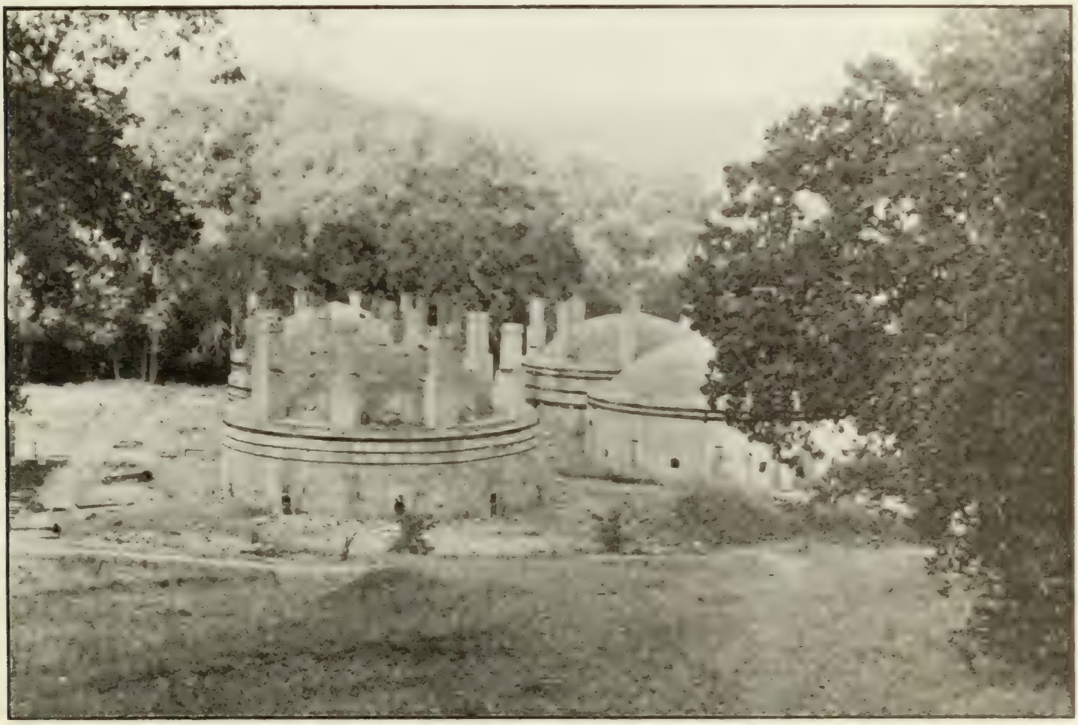


Photo No. 135. Circular Brick Kilns of California Brick and Pottery Company, Glen Ellen, Sonoma County.

Bibl.: R. VIII, p. 635; Bull. 38, p. 258.

At Skaggs Springs there is a deposit of yellow clay, which is stated to be suitable for terra cotta. Peter J. Curtis, owner.

Weise Clay Pit (also known as Beltane Clay). J. H. Weise, Glen Ellen, owner; J. T. Stanton, 315 Merchants National Bank Building, San Francisco, lessee. This deposit of white kaolin is in a hill about $\frac{1}{4}$ mile northeast of Beltane station, between Glen Ellen and Kenwood.

It is a high grade aluminum silicate, as will be noted from the analyses. It appears to have been originally a fine grained acid volcanic material, which has been very thoroughly kaolinized. In the lower part of the deposit, which has been opened up by several short tunnels, the kaolin is soft and has a greasy feel; while at the top of the hill it has been hardened by a subsequent infiltration of silica.

A considerable tonnage of this siliceous material has been employed by the Gladding, McBean Company, mixed with their Amador County clay in the manufacture of fire brick. The Beltane clay is stated to decrease the shrinkage. The Santa Cruz Portland Cement Company has been using the softer material from the lower levels in the preparation of a special white cement for decorative and statuary work. The fusion point of this clay is said to be very high—about 4500° F.

Analysis of "Beltane clay" by Smith, Emery & Company, Chemists, San Francisco.

	No. 1 (hard)	No. 2 (medium)	No. 3 (soft)
SiO_2	74.60%	56.29%	58.10%
Al_2O_3	15.97%	31.13%	26.79%
TiO_2	.21%	.31%	.56%
Fe_2O_3	.50%	.59%	1.17%
MnO	Trace	----------	Trace
CaO	.18%	.05%	.32%
MgO	.06%	.05%	.05%
Loss on ignition	8.80%	11.67%	12.66%
	100.32%	100.09%	99.65%

There are specimens of clay in the museum of the State Mining Bureau from Agua Caliente, Guerneville, Healdsburg, Mark West Springs, Santa Rosa and Sonoma, but the deposits are not at present utilized.

CEMENT BLOCKS.

George Reilly, 300 Olive street, Santa Rosa, has a plant where he makes concrete building blocks, sewer pipe, culverts and railroad ties. The equipment includes an electric motor, concrete mixer and a planer for dressing the artificial stone blocks. California cement is employed with sand and gravel from local deposits, principally from the bed of Santa Rosa Creek, near by.

Mr. Reilly has recently obtained patents on a clamp for fastening railroad rails to concrete ties, and also on a device for forming holes for new clamp anchorages in concrete or stone (*e. g.,* for placing switches, turnouts, etc.). He is placing these on the market in connection with his concrete ties for railroad use.

Sonoma Stone and Construction Company, Santa Rosa. Defunct.

Bibl.: Bull. 38, p. 170.

CHROME.

Chromite deposits are known at several localities in Sonoma County, but none of them are at present being utilized commercially, though a few small shipments have been made in the past. Among these occurrences may be noted the following:

Three miles west of Geyserville, south of wagon road.

At Asti Colony, three miles south of Cloverdale.

Dotta ranch near Healdsburg, Mrs. L. H. Dotta and sons, owners.

Chromite float is found along the ridge east of Healdsburg, running north from Fitch Mountain.

Near Lytton Springs, there is also chromite.

There is a deposit of chromite near the Madeira magnesite property, 5 miles north of Guerneville. George Madeira, Healdsburg, owner.

Sonoma Magnesite Company, adjoining on the east these magnesite deposits north of Cazadero, chromite is found in T. 9 N., R. 12 W.

Bibl.: R. IV, p. 137; XIII, p. 50; U. S. G. S. Bull. 430, p. 168.

COAL.

Some small strata of coal are known at several points in Sonoma County, but they are not utilized. Some of these are:

At the head of a gulch ¼ mile from the beach near Fort Ross.

Eight miles east of Stewart's Point on the road to Skaggs Springs.

Pierson Mine, on the Wrightson ranch, in Sec. 27, T. 8 N., R. 8 W., on the road to Mark West Springs; N. E. McGrew, owner. In 1910 and 1911 some development work was done.

On the *Taylor ranch,* 2 miles south of Santa Rosa, considerable money was spent in development work about twenty years ago. Though a fair quality of coal was found, the strata were too much broken up.

Bibl.: R. VII, Pt. I, p. 118; VII, pp. 151, 190; VIII, p. 634; X, p. 676; XI, p. 259; XII, p. 61; XIII, p. 55.

COPPER.

Altamont Group, in Sec. 17, T. 7 N., R. 10 W., 2 miles southeast from Monte Rio. Small detached masses and specimens of copper were found here, and some development work done, but no definite ore body uncovered.

Bibl.: Bull. 50, p. 167.

Archer Tract Prospect, in Sec. 30, T. 8 N., R. 10 W., east of Guerneville; Geo. K. Thornton, owner. Idle.

Bibl.: Bull. 50, p. 166.

Cornucopia Copper Mining Company (formerly Squaw Creek; also known locally as the *Healdsburg Copper*), W. M. Jacobs, Healdsburg (president and manager); H. A. Jacobs, Healdsburg (secretary). This group of three claims is in Secs. 33 and 34, T. 12 N., R. 9 W., 14 miles northeast from Cloverdale. The stage road to the Geysers runs within two miles of the claims, which are reached by trail. They were first located about 1902, and the present owners have been working them since 1912.

To uncover the ore body, the surface has been ground sluiced. It is stated there are two main "veins" (85 feet and 10 feet wide, one being a brecciated zone), also a third one, smaller, and that they have been traced for ¾ of a mile on the surface. The strike is northwest and the dip northeast, nearly vertical. The country rock is much altered. The ore carries copper carbonates at the surface, with chalcopyrite below, the gangue minerals being calcite and some quartz. There is a 40-foot shaft in the canyon, and a tunnel in 315 feet. In November, 1913, two men were driving this tunnel, which was expected to cut the ore in another 50 feet at 200 feet below the outcrop.

Gray Prospect, E. F. Bean, Healdsburg, owner. It is on Devil Creek, a branch of Austin Creek, north of Guerneville. Idle.

Grizzly Claim and *Healdsburg Lode,* north of Healdsburg. Idle.

Bibl.: R. V, p. 97; Bull. 50, p. 167.

Copper is also stated to have been found near *Skaggs Springs.*

Bibl.: R. V, p. 98.

Squaw Creek Copper Mines (see Cornucopia Company).

Wall Prospect. Copper indications were found at the Wall Spring Quicksilver mine, but nothing developed. H. C. Wall, Hilton, owner.

Bibl.: Bull. 50, p. 166.

Ward Tract, J. W. Ward, Healdsburg, owner. Copper float has been found on the Ward ranch in Sec. 22, T. 9 N., R. 10 W., but nothing has been developed.

Bibl.: Bull. 50, p. 167.

DIATOMACEOUS EARTH (see Infusorial earth).

GARNETS (see under Gems).

GEMS.

Garnets, of two varieties, are found in Sonoma County. On the Cox ranch, Mrs. Nate Cox, owner, 3 miles west of Healdsburg, *almandite* garnets occur abundantly in a chloritic schist. Many of them would be suitable for watch jewels if they could be separated economically from the enclosing schist. Their most likely commercial utilization, however, will probably be as an abrasive.

Grossularite occurs near Petaluma in association with copper minerals.

Bibl.: R. IV, pp. 99, 182; VI, Pt. I, p. 91; Bull. 37, p. 52.

Opals, of gem quality and a fair play of ''fire,'' have been found in association with the kaolin deposit on the Weise ranch between Glen Ellen and Kenwood. Some of these have been cut and sold in San Francisco. J. H. Weise, Glen Ellen, owner.

GOLD.

Traces of gold have been found at several places in Sonoma County, but nothing of consequence ever developed.

Bibl.: R. XIII, p. 436.

GRANITE.

Through an error, production of granite from Sonoma County was reported both to this Bureau and to the United States Geological Survey, for several years. I found, on visiting the quarries, that the material so reported from Agua Caliente is a vitrophyre associated with trachytic tuff. That classed under ''curbing'' from other parts of the county is the andesite from which most of the paving blocks are made.

Bibl.: Bull. 38, p. 376.

GRAPHITE.

On the property of the *Healdsburg Paint Company* (see also under *Mineral Paint*), southwest of Healdsburg, a deposit of graphite was uncovered, but it has not been developed.

Bibl.: Bull. 38, p. 281.

McPherson Ranch Deposit, L. McPherson, Healdsburg, owner. There is an undeveloped deposit of graphite of fair quality on this ranch in Secs. 13, 14, 24 and 25, T. 9 N., R. 10 W., 4 miles west from Healdsburg. There are specimens from this deposit in the museum of the State Mining Bureau. The material is suitable for use in paint manufacture or for stove polish. By washing and floating it could be used in lubricating compound.

Skinner Graphite Company, R. M. Skinner et al., Petaluma, owners. This graphite is on the Skinner ranch, in Sec. 14, T. 4 N., R. 7 W., 4 miles south of Petaluma on the San Rafael road. It was opened up in 1894, and the material shipped to San Francisco for paint manufacture. The output was valued at $9,000. Idle for several years.

Bibl.: Bull. 38, p. 281.

There is said to be a deposit of graphite 2 miles west of Cazadero. It is undeveloped. Specimens are also reported from other parts of the county.

Bibl.: R. VI, Pt. I, p. 111.

INFUSORIAL EARTH.

Collings Deposit, A. F. Collings, 1001 Orchard street, Santa Rosa, owner; John Frey, Eighth and Hooper streets, San Francisco, lessee. It is in Sec. 10, T. 8 N., R. 8 W., 1 mile north of Mark West Springs and 6 miles east of Windsor on the Northwestern Pacific railroad; elevation 600 feet (bar.). There is a bed of infusorial earth 5 feet thick, striking east and west, and dipping north at a flat angle. It is below a layer of soft, coarse-grained volcanic tuff; and has been worked by a small open cut and drift. A small tonnage was shipped in 1913.

Mt. Pisgah Vineyard Deposit, E. L. Goldstein Company, 333 Kearny street, San Francisco, owners. This is an undeveloped deposit of infusorial earth, said to indicate a large available tonnage. It is in Sec. 30, T. 6 N., R. 5 W., 2 miles northeast of Agua Caliente.

IRON.

There are indications of iron ore along the second ridge back from the shore line, beginning about 6 miles east of Fort Ross and continuing northwesterly into Mendocino County. The more important localities are:

Hooper Ranch, J. W. Hooper, owner, 5 miles north of Nobles.

Lancaster Ranch, W. M. Richardson, Plantation House, owner; east of Fisk's Mill. Both yellow ocher and hematite occur. Some of it is siliceous, and suitable for paint.

Fort Ross, a large body six miles east of Fort Ross.

Bibl.: R. IV, p. 182; XI, p. 461; Bull. 38, pp. 304, 365.

KAOLIN (see under Brick and Clay).

LIMESTONE.

Black Ranch Quarry, L. S. Black, Modesto, owner. This deposit is 6 miles north of Geyserville on Little Sulphur Creek. The Sonoma County Lime Company, A. H. Ingram, Santa Rosa, manager, burned some lime here in 1906–1907; but it is stated that they could not market the product on account of a labor boycott. No work has been done since.

Bibl.: R. XII, p. 396; XIII, p. 633; Bull. 38, p. 93.

Photo No. 176. Magnesite from Kolling deposit near Preston, Sonoma County, California, showing shrinkage cracks. Two thirds natural size.

There is a large deposit of limestone in Secs. 1 and 2, T. 9 N., R. 12 W., 15 miles west of north from Cazadero. It is stated to be traceable for a mile in length, and in places up to 300 feet in width. It could be used for building stone or for cement manufacture. It is a hard, fine-grained, compact limestone, red, white and cream colored. The deposit was at one time located by the Healdsburg Marble Company but abandoned on account of being too far from a railroad.

MAGNESITE.

There are numerous deposits of magnesite in Sonoma County, both large and small, as regards surface showings; but, on the whole, there has been too little development work to state anything definite yet as to their future productiveness. The largest deposits are handicapped so far by a lack of transportation facilities; but this feature will doubtless be improved before long. The total recorded production for the county has been but 870 tons to the end of 1913.

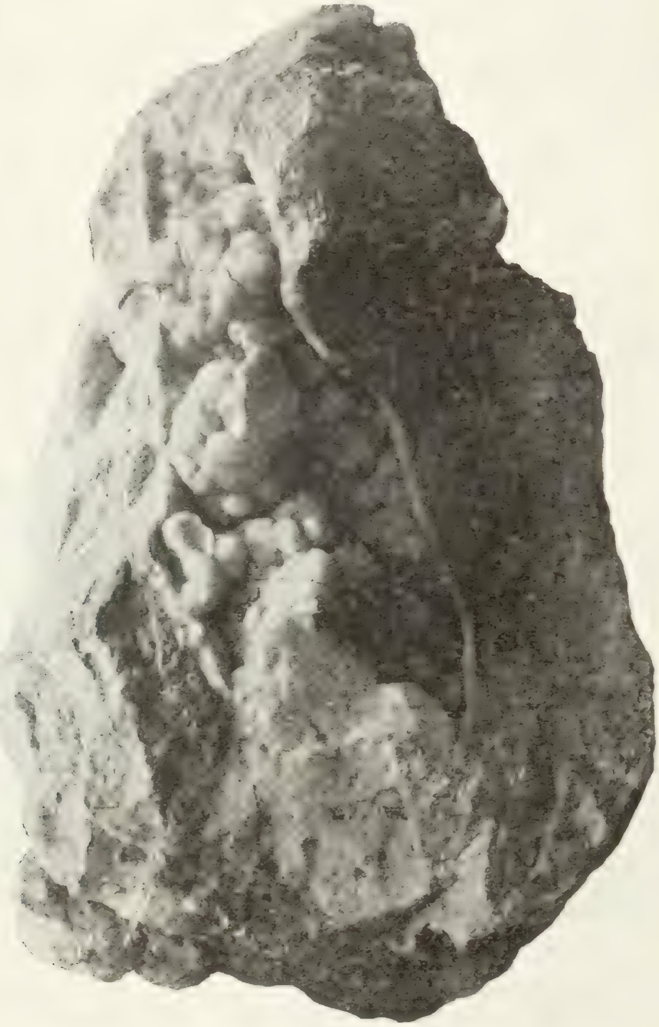


Photo No. 177. Small Vein of Magnesite in serpentine, showing botryoidal forms and shrinkage cracks. Two thirds natural size. Kolling deposit, Sonoma County, California.

For a statement of the properties and uses of magnesite see *Magnesite* under *Napa County.*

Bibl.: Bull. 38, pp. 331–333; U. S. G. S., Bull. 355, pp. 22–28; Bull. 540, pp. 490–498.

Ferdinand Albertz has an undeveloped deposit of magnesite on his ranch 1 mile southwest of Cloverdale.

Louis R. Ball, of Presidio, San Francisco, Cal., has an undeveloped deposit of magnesite near the Gilliam Creek deposits north of Guerneville, which are described below.

Brush Deposit, F. W. Brush took out about 250 tons of magnesite from a pocket on his ranch three miles east of Cloverdale. No further work has been done since 1909.

Bibl.: Bull. 38, p. 331.

Creon Deposit (see Kolling).

Cummings Ranch, Chas. G. Flick, owner. This deposit of magnesite in Sec. 23, T. 11 N., R. 11 W., about 2 miles southwest of Cloverdale, was worked for a short time by the Sotoyome Magnesite Company of Healdsburg. It has now been idle several years.

Bibl.: Bull. 38, p. 332; U. S. G. S. Bull. 355, p. 24.

Eckert Ranch (see *Yordi*).

Gilliam Creek Deposits (see *Healdsburg Marble Company,* and *Western Carbonic Acid Gas Company*).

Healdsburg Marble Company (also known as the *Madeira Deposit*), George Madeira, Healdsburg, manager. It is in the southwest corner of Sec. 31, T. 9 N., R. 10 W., 5½ miles north from Guerneville; elevation 1700 feet (bar.). There is a series of magnesite veins in serpentine from a few inches to 10 feet wide, and occurring over a width of about 1400 feet. They strike west of north and dip west at about 70°. The larger veins are of very good quality. There is a considerable tonnage in sight at the surface which can be cheaply quarried; but except for a couple of short tunnels there has been no development work underground.

At the west end, the veins are narrow and are banded with a green dolomitic material, chalcedony and quartz, forming a variety of "verde antique marble." It was for this that the deposit was originally located (1894), with the intention of putting it on the market as an ornamental building stone. This is the deposit described by Hess (see Bibl.) as "un-named."

The property has no transportation outlet as yet, but it is only a half mile from the claim of the Western Carbonic Acid Gas Company, which has a wagon road to Guerneville. The claims are patented.

Bibl.: R. XIII, p. 640; Bull. 37, p. 112; Bull. 38, pp. 114, 333, 369; U. S. G. S. Bull. 355, pp. 25, 26; Bull. 540, p. 497.

Kolling Deposit (formerly *Creon*), J. Kolling, Preston, owner. This is in Sec. 32, T. 12 N., R. 10 W., 2 miles north of Cloverdale and 2 miles east of Preston on the Northwestern Pacific Railroad; elevation 1500 feet (bar.). The wagon road to Preston has a heavy grade, but it is all down hill. It is stated to cost $1.50 per ton to haul the magnesite to the railroad. There are four small, disconnected deposits of magnesite, the geology of which has been described by F. L. Hess (U. S. G. S., Bull. 355, p. 22). The characteristic botryoidal forms and shrinkage cracks are abundant in parts of these deposits, and the edges of the veins are more or less mixed with serpentine. (See photos Nos. 176, 177).

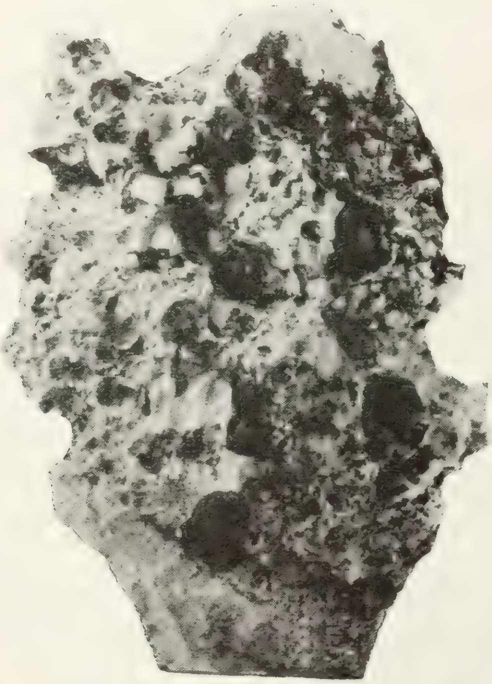


Photo No. 178. Magnesite from Kolling deposit, Sonoma County, California, showing pitted surface due to weathering. Two thirds natural size.

A peculiar pitted weathering effect was also noted (photo No. 178). Something over 500 tons of magnesite have been shipped from the property, but no work has been done the past five years (to January, 1914).

There is some heavy magnesite float on the north bank and in the bed of Big Sulphur Creek, just above the mouth of the canyon. This is below and about a mile south of the Kolling ground.

Bibl.: Bull. 38, pp. 331, 332; U. S. G. S. Bull. 355, pp. 22, 23.

Madeira (see *Healdsburg Marble Company*).

Magnesite float was found by the writer in Mark West Creek a short distance above Mark West Springs, but its source was not located.

On land owned by *M. C. Meeker,* of Camp Meeker, in Secs. 2 and 3, T. 8 N., R. 11 W., northwest of Guerneville, are scattered indications of magnesite, but no development work has been done.

Norton Ranch, E. M. Norton, owner. The Sotoyome Magnesite Company, of Healdsburg, took out a small tonnage of magnesite from an irregular deposit on the Norton ranch on Dry Creek, about 10 miles northwest of Healdsburg and 4 miles from Geyserville. No further work has been done.

Bibl.: Bull. 38, p. 333; U. S. G. S. Bull. 355, p. 28.

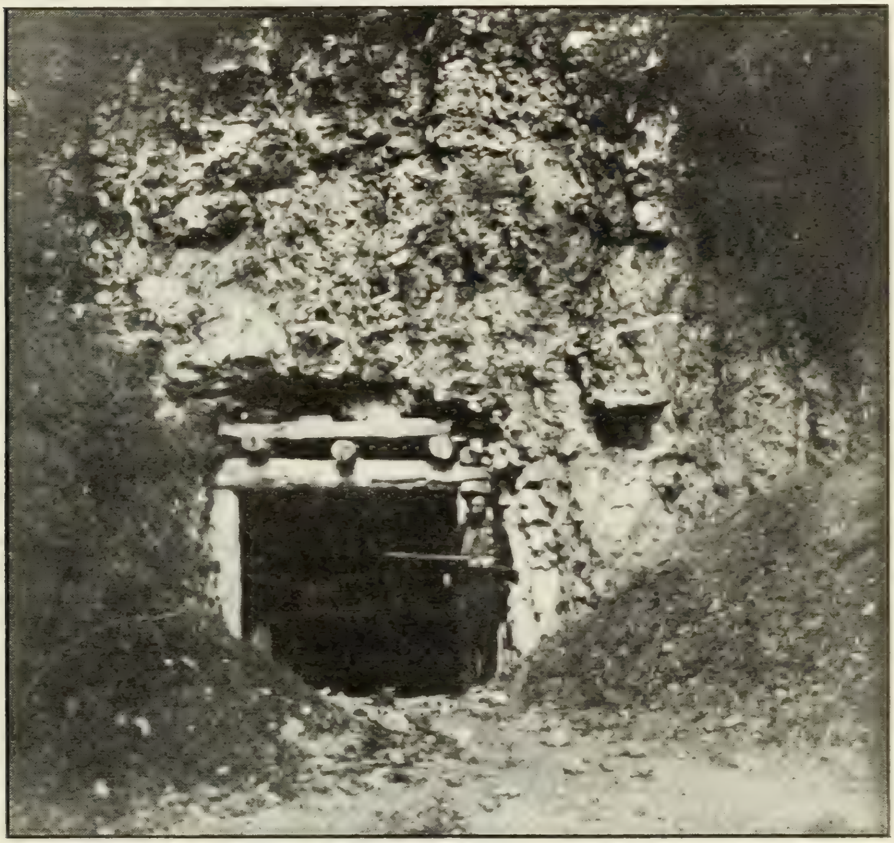


Photo No. 158. Upper tunnel, Cecilia Claim ("Red Slide"), Sonoma Magnesite Company, near Cazadero, Sonoma County, California.

Red Slide Deposits (see *Sonoma Magnesite Company*).

Sonoma Magnesite Company, U. S. Webb, president; Frank A. Janda, Chicago, Ill., secretary; H. P. Bee, manager; John M. Nordheim, superintendent. San Francisco office, Humboldt Bank Building.

Since my visit to the property (November, 1913), the control of the company has been transferred from A. B. Davis et al., of San Francisco, to the above-named. The new owners are proceeding to patent the claims and propose to increase development and improve the transportation facilities. The ground was at one time located by Geo.

Madeira, of Healdsburg, but lost through litigation. (Bull. 38, p. 333; Bull. 66, pp. 58, 59.)*

There are 30 claims in this group covering what are known as the Red Slide deposits on East Austin Creek.

The claims as indicated on the map are named as follows:

1. Flora
2. Cecilia
3. Marie
4. Seymour
5. Cyril
6. Henrietta
7. Constance
8. Manson
9. Otto
10. James
11. Josef
12. Yard
13. Marquise
14. Peterson
15. Burris
16. Bertram No. 2
17. Arthur No. 2
18. Francis
19. Ford
20. Clara No. 2
21. Alfred No. 2
22. Vera No. 2
23. Trent No. 2
24. Bertram
25. Henry
26. Charles
27. Phillip
28. Vera
29. Empire
30. Standard

They are in Secs. 6, 7, 8, 17 and 20, T. 9 N., R. 11 W., 6 miles north from Cazadero (see map), but at present reached by road from Guerneville, 12 miles to the southeast. The company has a wagon grade about two thirds completed to connect with Watson station on the Northwestern Pacific Railroad, a distance of 11 miles. At the time of my visit this was the only work being prosecuted. By reason of inclement weather and a lack of time, a detailed study of the geology was not made.

There are three groups of magnesite outcrops with a northwest trend, in a large belt of serpentine. No work has been done on the northernmost one, which was not visited. Of the other two the principal work has been done on the lower group, mainly on the ''Cecilia'' claim at a sharp turn in the creek. Here there are two adits, the lower one of which is in over 200 feet, starting as a drift on the outcrop of a vein about 9 feet wide; but after 50 feet, turning to the northwest and running as a crosscut for about 180 feet, where a small step-faulted vein of magnesite was struck.

The upper Cecilia tunnel, which is supposed to cut the same formations as the lower, also starts on a large outcrop (see photo No. 158), but is run entirely as a crosscut. It is 50 feet above the lower tunnel and has cut veins showing widths of 12 feet, 5 feet, 15 inches, 18 inches, 6 inches, and 8 inches, as well as some smaller ones. This magnesite is of high grade as will be noted from the analyses quoted below. Magnesite outcrops in the creek bed here, and continues for a short distance

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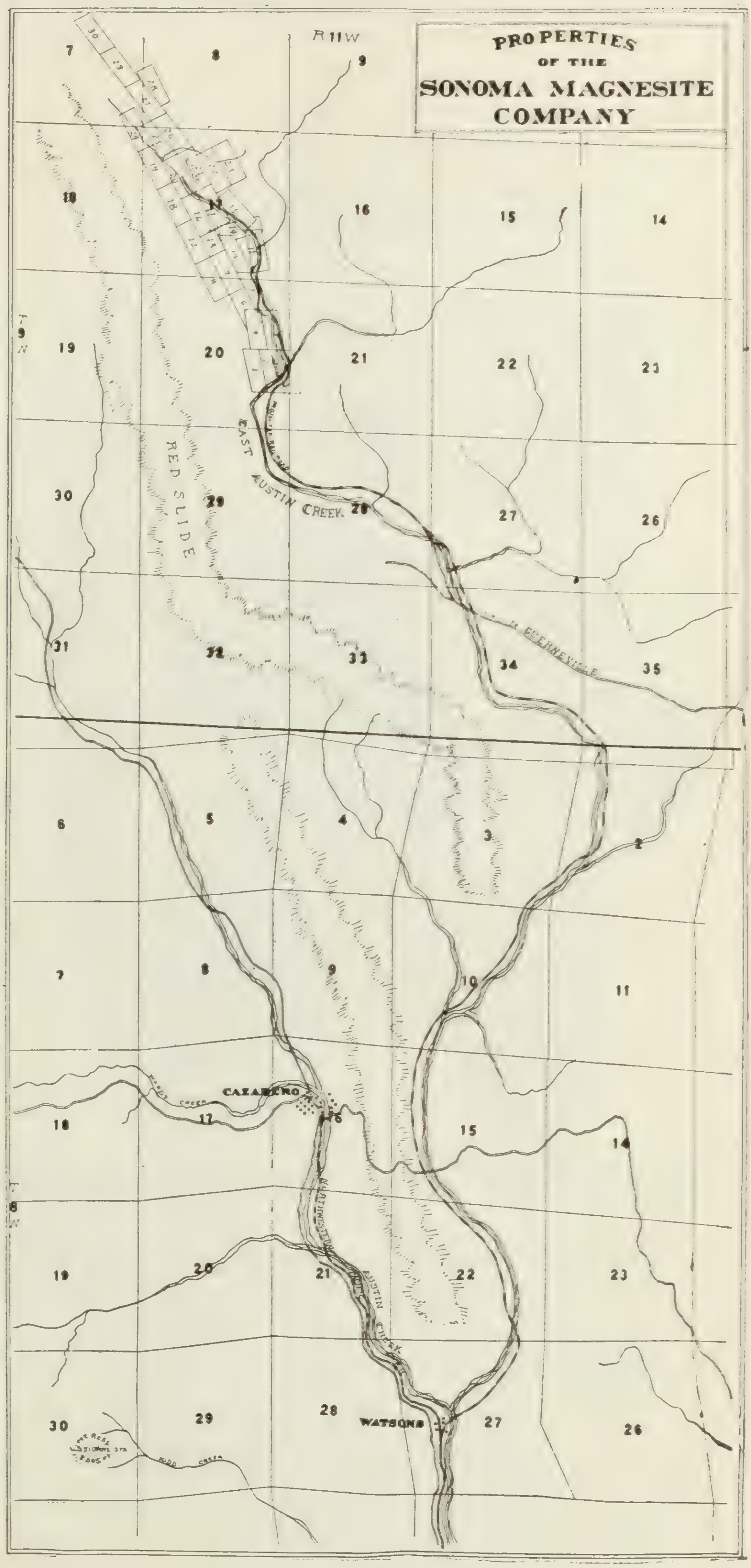
*Since this description of the property was put in type, the new company has completed its transportation connections, built a calcining plant, and is now making regular shipments. A 24-inch gauge railroad was laid on the road grade, and a distillate engine furnishes the motive power. Connection is made with the Northwestern Pacific at Magnesia station on a spur of about one-half mile from Watsons.

The magnesite is being mined at the lower deposit, where a quarry face has been opened up. In the calcining plant, a rotary kiln, oil-fired, is in operation, with capacity of 30 tons per 24 hours. A second kiln is stated to be enroute for installation. The crude mineral is crushed to pass a 2-inch ring before charging to the kiln; and the calcined material is pulverized after cooling in steel bins. Power is obtained by an oil-burning steam plant. The kiln consumes ¾ bbl. of oil per ton of calcined magnesia obtained, which is reduced to 5% CO_2. The finished product is packed in paper-lined duck bags for Pacific Coast consumption, and in 400-pound paper-lined barrels for the eastern market. Shipments are now being made to New York via the Panama Canal, an ocean rate of $5.00 per ton from tidewater, San Francisco, to New York having been secured. Seventy men are at work. —W. W. B., July, 1915.


PROPERTIES
OF THE
SONOMA MAGNESITE
COMPANY
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RED SLIDE
EAST AUSTIN CREEK
TO GUERNEVILLE
CAZADERO
WARDS CREEK
AUSTIN CREEK
WATSONS
KIDD CREEK

up over the hill, but apparently does not cross the creek to the south. The general trend of the veins is about N. 25° W., and the dip northeast. There are a few hundred tons of broken magnesite on the dumps of these tunnels and as float below. Besides the usual characteristics, specimens were found exhibiting parallel shrinkage cracks (see photo No. 179). Almost no drifting has been done so far, so that the continuity or the extent of these veins underground is as yet uncertain.

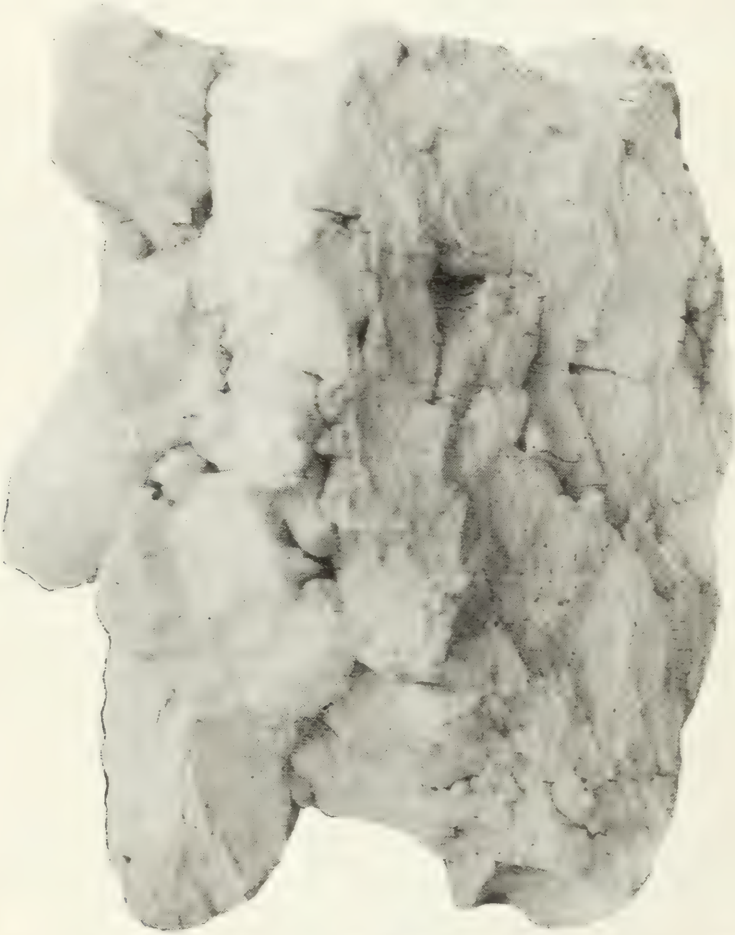

Photo No. 179. Magnesite from "Red Slide" deposit—Sonoma Magnesite Company, Sonoma County, California. Showing parallel shrinkage cracks. Two thirds natural size.

At the upper claims the principal outcrop is on the Alfred (see photo No. 159). It appears to be at least 25 feet thick at the center, dipping at about 40° NE., and is stated to have been traced for a total length of about 1000 feet. It thins out, however, in both directions from the center. The only development work on this group is a crosscut tunnel started near the creek over 200 feet below the outcrop, and which is in about 100 feet. It has not yet cut any magnesite. Vera No. 2 adjoins the Alfred.

There is also on the claims a good stand of cypress suitable for mine timbers, and some "fir" (Douglas spruce) and redwood.

It is intended when development has proceeded sufficiently to warrant it, to erect calcining furnaces on the property, a gas plant and possibly a brick plant, and to convert the wagon grade into a railroad so as to handle the products direct to tidewater without transshipment.

It is stated that with properly equipped furnaces one barrel of crude oil will produce one ton of calcined magnesite. Mr. Davis has gone quite thoroughly into the subject of the uses for magnesite, and its market, and he estimates that with rail facilities to tidewater the material can be shipped to Chicago, New York and other eastern points via Panama Canal at a rate which can compete with the Grecian and Austrian product. The market in Japan and China can also be reached profitably.

ANALYSES.

Sample from—	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	CO_2	$MgCO_3$	Undetermined
[1]Cecilia (upper tunnel)	7.67	0.26	0.29	0.04	43.42	48.08	--------	0.24
[2]Cecilia	3.66	.75	.44	.20	44.90	49.20	--------	0.85
[3]Alfred	[6]2.50	0.55		[7]2.30	--------	--------	93.92	.36 [9].37
[4]Alfred	2.50	2.2		--------	46.0	[8]49.3	--------	--------
[5]Vera No. 2 (calcined)	.74	5.05		None	94.21	--------	--------	--------
[5]Alfred (calcined)	6.66	10.22		.52	82.60	--------	--------	--------
[5]Vera (calcined)	7.85	.21	4.63	--------	87.31	--------	--------	--------

[1]Analysis by A. J. Peters (U. S. Geological Survey).
[2]Analysis by W. C. Wheeler (U. S. Geological Survey).
[3]Analysis by Stauffer Chemical Company, San Francisco.
[4]Analysis by Selby Smelting and Lead Company, Selby, California.
[5]Analysis by Booth, Garrett & Blair, Philadelphia, Pa.
[6]Silicates.
[7]Calcium carbonate.
[8]Calculated.
[9]Moisture.

It appears from these analyses that some of the magnesite from the upper claims carries more iron than that from the lower group; also that the content of silica is variable. As has already been noted (see introduction to *Magnesite* under *Napa County*), in the manufacture of magnesia brick for basic open-hearth liners in the steel process, a small percentage of iron (up to say 10 per cent) is not only permissible but desirable. So, if the eastern market can be reached economically, it would seem that this lower grade material of the Sonoma Magnesite Company may be made available some day.

Bibl.: Bull. 38, p. 333; Bull. 66, pp. 58, 59; U. S. G. S. Bull. 355, p. 26; Bull. 540, pp. 490–495.

Photo No. 159. Magnesite outcrop on Alfred Claim ("Red Slide") of Sonoma Magnesite Company, Sonoma County, California.

Sotoyome Magnesite and Mineral Paint Company (see *Healdsburg Paint Company,* under *Mineral Paint*).

Sotoyome Magnesite Company (see *Norton Ranch*).

Western Carbonic Acid Gas Company, Chas. S. Harker, Agnew, president and manager. This group is at the head of Gilliam Creek, in Sec. 6, T. 8 N., R. 10 W., 5 miles north from Guerneville, from which it is reached by wagon road, the last mile having been built by the company. This deposit is similar to that of the Healdsburg Marble Company, above it near the top of the ridge and about a half mile to the north. There are several large outcrops of magnesite occurring in serpentine. Very little development work has been done—a few surface cuts.

The following analyses of material from this group are given by H. S. Gale (U. S. G. S. Bull. 540, p. 497):

	No. 1	No. 2
SiO_2	3.51%	10.21%
Al_2O_3	1.10%	.31%
Fe_2O_3	.80%	.74%
CaO	1.46%	.59%
MgO	43.65%	41.06%
CO_2	49.16%	44.76%
Undetermined	.32%	2.33%
	100.00%	100.00%

Bibl.: U. S. G. S. Bull. 355, p. 24; Bull. 540, pp. 495–497.

Yordi Ranch (formerly *Eckert*), Mrs. Grace P. Yordi, Cloverdale, owner. It is 2 miles southeast of Cloverdale, on the east side of the Russian River; elevation 425 feet (bar.). Several years ago about 700 tons of magnesite are reported to have been dug from the soil-covered hillside above the road, and 400 tons shipped. It was not until 1912 that the balance was shipped to San Francisco. The magnesite was apparently residual boulders in the soil overlying a serpentine bedrock.

Bibl.: Bull. 38, p. 333; U. S. G. S. Bull. 335, p. 23; Bull. 540, p. 498.

MANGANESE.

Shaw Prospect, Estate of I. E. Shaw, Cloverdale, owner. There is a deposit of high grade manganese ore on the Shaw ranch, 7 miles northwest of Cloverdale, on which a small amount of development work has been done.

Bibl.: R. XII, p. 330; XIII, p. 507; Bull. 38, p. 337; U. S. G. S. Bull. 427, p. 163.

Besides the above, there are specimens of manganese ore in the museum of the State Mining Bureau from Freestone, Guerneville, Mark West Springs and Santa Rosa.

Bibl.: R. IV, p. 316; Bull. 38, p. 368.

MARBLE.

Healdsburg Marble Company (see under Magnesite; also under Limestone).

MINERAL PAINT.

Brown's Ochre Mine (see *Meeker*).

Healdsburg Paint Company, T. S. Merchant et al., Healdsburg, owners. This property was at one time known as the Indian Metallic Red Paint Mine, and also under the name of Sotoyome Magnesite and Mineral Paint Company. It is on Porter Creek in T. 8 N., R. 10 W., about 10 miles by road southwest of Healdsburg. The material is a low grade hematite, high in silica, and a considerable tonnage was shipped out some years ago, but none since 1906.

Bibl.: R. XI, p. 462; R. XII, p. 406; XIII, p. 643; Bull. 38, p. 340.

Lancaster Ranch (see under Iron).

Meeker's Ochre Deposit (formerly *Brown's*) M. C. Meeker, Camp Meeker, owner. This deposit of ochreous clay is in Sec. 21, T. 7 N., R. 10 W., 1½ miles north of Camp Meeker. Several years ago there were four or five carloads of paint shipped from this property, but none since.

Bibl.: Bull. 38, p. 340.

Occidental Deposit, J. D. Connelly, owner. There is an undeveloped deposit of ochreous clay, just west of the hotel at Occidental.

There is said to be a small spring deposit of yellow ochre 5 miles northeast of Cazadergo.

Skinner Graphite Company (see under Graphite).

Sotoyome Magnesite and Mineral Paint Company (see *Healdsburg Paint Company*).

MINERAL WATER.

Sonoma County, like its neighbors, Lake, Napa, and Mendocino counties, has a large number and variety of mineral springs. Some of these are well known, and have a world-wide reputation. They vary in character and composition from the cold "seltzer" of Lytton's to the boiling hot waters and steam vents of The Geysers. Most of them are well equipped with comfortable hotels and cottages, and are fairly accessible to transportation lines. Sonoma County is one of the "playgrounds" of California and many of her summer resorts are located around these mineral springs.

Agua Caliente Springs, Theodor Richards, Agua Caliente, owner. These springs are at Agua Caliente on the Northwestern Pacific Railroad, 2½ miles northwest from Sonoma; elevation 131 feet (Northwestern Pacific). It is stated that originally the hot spring here was merely a mud hole used for many years by the Indians. The present owner has drilled six wells, and put in a large swimming tank, a bathhouse, and a bottling works. The water is pumped, though it is stated that in the winter the wells have a small artesian flow.

The water pumped to the swimming tank shows a temperature of 102° F. at the pump (2 wells combined, 1 of which is said to be warmer than 102°). The well from which water is bottled shows a temperature of 95° F. at the pump, and is discharged into a tank to cool before bottling. Electric power is used, and there is an auxiliary gasoline engine for emergency use. There is a capping machine, carbonator, and mechanical labeler. There are accommodations for 300 guests in the hotel and cottages.

Bibl.: R. XI, p. 458; XIII, p. 521; U. S. G. S., Water Sup. Pap. 338, p. 113.

Agua Rica Hot Sulphur Spring (see *Boyes*).

Alder Glen Springs, William Lang, Pioneer Soda Water Company, Oakland, owner; J. A. Serres, lessee. These springs are in Sec. 3, T. 11 N., R. 11 W., 3 miles northwest of Cloverdale; elevation 525 feet (bar.). McCray station on the Northwestern Pacific is the railroad point during the summer season. The springs are in serpentinized sandstone, and the four principal ones have the following temperatures: Sulphur, 58° F.; Magnesia, 56°; Soda, 57°; Iron, 57°. Water from the soda springs is bottled ''natural'' at the spring. Some is also shipped in barrels to Oakland and sold in siphons, carbonated. The hotel and cottages are picturesquely situated in a beautiful canyon of alders, redwoods and oaks.

Bibl.: WINSLOW ANDERSON, ''Mineral Springs and Health Resorts of California,'' p. 76, U. S. G. S. Water Sup. Pap. 338, p. 166.

Altamont Medical Springs, J. D. Connelly, Occidental, owner. This is a lightly mineralized spring in Sec. 34, T. 7 N., R. 10 W., at Occidental on the Northwestern Pacific Railroad. None is bottled for sale. There is a hotel in connection.

Barcal Spring, Barcal Water Company, operators; J. Kolling, Preston, manager. This calcic-magnesic spring is near the Kolling magnesite deposit in Sec. 32, T. 12 N., R. 10 W., about 2 miles east of Preston on the Northwestern Pacific Railroad at an elevation of 1375 feet (bar.). They have been bottling for about seven years past, originally at the spring itself, but now the water is piped 9000 feet to the works at Preston station. Electric power is used and three men are employed. The product is put up both carbonated and natural. There is no resort in connection with this spring. Near-by there is also an iron spring, but not utilized.

Boyes Hot Springs (at one time called *Agua Rica*), Boyes Hot Springs Company, owners; Henry Trevor, San Francisco, president; Thos. P. Boyd, Santa Rosa, secretary; R. G. Lichtenberg and Dr. E. L. Parramore, managers. The post office and railroad station are both named Boyes Springs. It is 2 miles northwest of Sonoma; elevation 129 feet (Northwestern Pacific). The property was formerly owned by Captain Boyes, and has been operated by the present company for seven years.

Water is obtained from both springs and wells. It is pumped to tanks to give pressure for the bathhouse use, and also pumped to the bottling works, where it is cooled before bottling. Electric power is used. The bottling is done under lease from the company by John W. Kelly. Most of the production is carbonated, but a few cases per month, ''still.''

There is a fine large swimming pool and a well-appointed bathhouse. The temperature of the water of the principal spring was 112° F., taken at the pump. There are accommodations for 300 guests in the hotel, cottages and tents.

Bibl.: R. XI, p. 458; XII, p. 347; XIII, p. 521 U. S. G. S. Water Sup. Pap. 338, p. 112.

Burns Springs, F. M. Hathaway, owner. These springs are on the Hathaway ranch, 3½ miles east of Glen Ellen, but are not utilized except by the occupants.

Bibl.: R. XII, p. 347; XIII, p. 521.

California Geysers (see *The Geysers*).

Camp Rose. There is stated to be a sulphur water spring at the Camp Rose resort, 1½ miles from Healdsburg.

Chimney Rock Spring, J. A. Watson, Guerneville, owner. This sulphur water spring is at the corner of Secs. 26, 27, 34 and 35, T. 8 N., R. 11 W., 6 miles west of Guerneville; and is so called because of its proximity to a natural topographic feature of the same name. The elevation is 900 feet (bar.). It is stated that water has been bottled here in a small way by hand for about twenty-five years.

Eleda (see *Fetters*).

Fetters Hot Springs (one time called *Eleda*), George Fetters, owner. This resort at the post office of the same name is between Boyes and Agua Caliente springs in the warm water belt, extending northwesterly from Sonoma. Elevation 124 feet (Northwestern Pacific). There are 3 wells, stated to be artesian in winter, the first one of which was drilled in 1908. The warm water was struck at a depth of 300 feet. It is pumped, using electric power, to a tank, for swimming and bathing. A small amount is bottled, carbonated, for use at the hotel. The temperatures of the two principal wells are said to be 114° F. and 90° F., respectively, but as they are capped, and the pump was not running, I was unable to take a thermometer reading at the time.

Bibl.: U. S. G. S. Water Sup. Pap. 338, p. 114.

Geysers (see "*The Geysers*").

Hoods Hot Springs, O. R. Baldwin, Cloverdale, owner. In the canyon of Dry Creek, 15 miles north of west from Cloverdale. Two springs. Temperature 100° F. Small flow. Used locally for bathing.

Bibl.: U. S. G. S. Water Sup. Pap. 338, p. 82.

Kawana Springs (formerly *Taylor's White Sulphur Springs*), J. S. Taylor, Santa Rosa, owner; P. Criblet, lessee. These springs are in Sec. 36, T. 7 N., R. 8 W., 2½ miles southeast from Santa Rosa; elevation 276 feet (bar.). The principal spring has a temperature of 57° F. The hotel has accommodations for about 100.

Bibl.: R. VI, Pt. I, p. 75; X, p. 676; U. S. G. S. Bull. 32, p. 209; Water Sup. Pap. 338, p. 256: ANDERSON (op. cit.), p. 264.

Lytton Springs (see *Salvation Army*).

Mark West Springs, J. O. Wickham, Santa Rosa, owner. These well known springs are in Sec. 14, T. 8 N., R. 8 W., 10 miles north of Santa Rosa, from which city they are reached by automobile stage; elevation 450 feet (bar.). The warm springs are on the edge of Mark West Creek. The following temperatures were observed: Bath Spring, 93° F. (strong flow); Magnesia, 90°; "Plunge," 92° (has excess gas); Sulphur, 90°; Arsenic, 65°; two, iron 58° each; one, iron 54°; two "iron" across creek from others, 67°. The Bath Spring water, when a higher temperature is desired, is heated artificially.

The hotels and tents will accommodate about 150 guests. One picturesque feature of this resort is the large wild grape arbor in front of the hotel. There are eleven trunks up to 8 inches in diameter, which are twined around the porch posts, and the vines spread out on the arbor frame over the driveway.

Bibl.: R. VI, Pt. I, p. 75; VIII, p. 634; XII, p. 347; XIII, p. 522; U. S. G. S. Bull. 32, p. 206; Water Sup. Pap. 338, p. 115; ANDERSON (op. cit.), p. 192.

On the *James O'Brien Ranch,* one mile northwest of Sea View, in Sec. 7, T. 8 N., R. 12 W., there is a cold mineral water well. It is at a station on the stage road west from Cazadero.

O'Donnell's Sulphur Spring is near Glen Ellen.

Ohms Springs—a drilled well ½ mile southeast of Boyes Springs. A small resort. Mrs. F. Shirley, Sonoma, owner.

Bibl.: U. S. G. S. Water Sup. Pap. 338, p. 113.

Salvation Army's Boys and Girls Industrial Home and Farm (inc.) (formerly Lytton Springs; also Golden Gate Orphanage), Major C. W. Bourne, president; A. E. Marpurg, secretary; post office, Lytton. These springs were originally and for many years known as Lytton Springs. The property is now maintained as an orphans' home by the Salvation Army. There are two principal springs, with the following temperatures: Soda, 64° F.; Seltzer, 62°. The soda spring is at an elevation of 425 feet (bar.), or 200 feet higher than the "seltzer" and ½ mile distant. The latter makes a very pleasant table water. A few cases of water per month are put on the market, being hauled in barrels to Healdsburg, and there bottled by a local company. The management desires to lease the bottling privilege.

Bibl.: R. VI, Pt. I, p. 74; VIII, p. 634; X, p. 675; XII, p. 347; XIII, p. 522; U. S. G. S. Bull. 32, pp. 205, 206, 211; Water Sup. Pap. 338, p. 165; ANDERSON (op. cit.), pp. 188–190.

Skaggs Hot Springs, Peter J. Curtis, Skaggs, owner. This group of well known hot springs is on Warm Spring Creek, in Secs. 23 and 24, T. 10 N., R. 11 W., 9 miles west of Geyserville, from which it is reached by a good automobile road. There has been a resort here since previous to 1875. The present owner bought the property in 1913, having had it leased for the five years previous.

There are three principal springs, all with good strong flows, and all have excess carbonic acid gas, especially the third one noted below, which is very vigorous. While nearly all of the hot springs, which have been observed by the writer, are more or less sulphurous, these at Skaggs are noticeably free from sulphuretted hydrogen. The following temperatures were recorded: 124° F., 125° and 130°. The last mentioned is inclosed by a concrete curb, and the others by brick. There is a cold soda spring about 300 yards above. There are accommodations for 200 in the hotel, cottages and tents. When visited (November, 1913), a swimming tank 30 feet by 60 feet was being built, and other improvements planned.

Bibl.: R. VI, Pt. I, p. 75; VIII, p. 634; X, p. 675; XII, p. 347; XIII, p. 522; U. S. G. S. Bull. 32, pp. 207, 211; Water Sup. Pap. 338, pp. 81, 82; ANDERSON (op. cit.), p. 244.

The State Home at Eldridge has a warm spring similar to the others in the Sonoma Valley.

Bibl.: U. S. G. S. Water Sup. Pap. 338, p. 114.

Taylor White Sulphur Spring (see *Kawana*).

"The Geysers," D. and H. A. Powell, San Francisco, owners; Chas. Boldsdorff, 199 Fourth street, San Francisco, lessee; post office, "The Geysers." These famous hot springs are in the northern corner of Sonoma County, in Sec. 13, T. 11 N., R. 9 W., 18 miles east of Cloverdale; elevation 1450 feet (bar.) on the hotel porch. During the summer months an automobile stage line runs to The Geysers from both Healdsburg and Cloverdale. From the latter it is a picturesque ride up the winding and rugged canyon of Big Sulphur Creek, one time called the Pluton River. Formerly there was also a stage line from Calistoga on the east.

These "geysers" themselves (though there are no true geysers that spout high in the air, as at the Yellowstone Park, Wyoming) are a series of boiling hot springs in two short tributary canyons on the north side of the creek, opposite the hotel (see photo No. 146 and No. 151). The ebullition is so violent in the one called the "Devil's Teapot" that a column of water about a foot across is continually projected 10 to 12 inches above the surface of the small surrounding pool. Because of this violent bubbling, I was unable to take the temperature of this particular spring, not having a registering thermometer. Scalded fingers were the reward of attempting to get it with the thermometer carried. Around this pool is a black deposit of iron sulphide. A small vent near-by gave 206° F., while at the "Devil's Kitchen" just below, over a space of several feet, temperatures of 130° to 202° were obtained. At a steam vent above, 210° was obtained and 206° at another black sulphur spring. Sulphur crystals are continually forming around the steam vents. Epsomite and other minerals, the result of deposition from the vapors and of efflorescence, are abundant.

Photo No. 146. The Geysers Canyon, Sonoma County, California, from [illegible] across Big Sulphur Creek.

Just over a small ridge from the main group and in another ravine to the east, is the "Steamboat Geyser." This steam vent roars with sufficient pressure that a 2-inch rock dropped on it is thrown off violently before it has a chance to cover the aperture. The temperature is 212° F. In the early days of the resort, this vent was capped with a steam whistle (hence the name); but it is stated to have been blown off. Because of the noise it never was replaced.

On the edge of the main creek below these ravines, are a number of other springs, the principal ones having the following temperatures: "White Sulphur," 68° F.; "Hot Sulphur," 100°; "Hot Iron," 130°; "Hot Magnesia," 143°. The last named is the one from which water is bottled for sale. Formerly the bottling was done at The Geysers. Now, except for a few cases per month for use at the hotel, it is shipped in barrels to San Francisco and Richmond for bottling. The hotel, which has accommodations for 150, is usually closed from October to May first.

Photo No. 151. Looking down the Geysers Canyon, Sonoma County, California.

Because of the neighboring quicksilver districts, these solfataric springs have been much described and discussed in relation to the association of hot springs with the genesis of quicksilver ores. Along Big Sulphur Creek, both above and below Geyser Canyon, are several other places of similar deposits but where activity is now extinct. There is a "sulphur bank" a short distance below. The "Little Geysers" are 3 or 4 miles above the main group.

Bibl.: R. IV, p. 182; VI, Pt. I, p. 75; VIII, p. 635; X, pp. 672–675; XII, p. 347; XIII, p. 521; U. S. G. S. Mon. XIII, p. 377;

Bull. 32, pp. 204, 206; Water Sup. Pap. 338, pp. 83–88; ANDERSON (op. cit.), pp. 136–154; GEOL. SURV. OF CAL., Geology Vol. I, pp. 93 *et seq.*

Wall Spring, H. C. Wall, Hilton, owner. This is a magnesia spring in Sec. 30, T. 8 N., R. 9 W., northeast of Hilton. There was formerly a resort here but it has been closed the past two years.

Bibl.: U. S. G. S. Water Sup. Pap. 338, p. 257.

In addition to the above springs there is a cold magnesia spring on Mt. Jackson near Guerneville, *G. F. Austin,* owner; a cold sulphur water spring on the *J. C. Junker* ranch above the Great Eastern quicksilver mine near Guerneville; a warm sulphur water spring on land of the *Sonoma Magnesite Company,* north of Cazadero; *Los Guilicos Warm Springs,* 1½ miles southwest of Kenwood; and *McEwan Ranch,* 3 miles southwest of Kenwood. About ½ mile south of Glen Ellen, on the edge of the creek, there is a spring; temperature 76° F.; with excess CO_2, though it has no distinct mineral taste. None of these springs are at present utilized. There are also a number of small, locally known, cool sulphur springs on Sulphur Creek and Little Sulphur Creek, near Cloverdale.

Bibl.: U. S. G. S. Water Sup. Pap. 338, pp. 114, 258.

NATURAL GAS.

At several places, in the vicinity of Geyserville and in the valleys of Sonoma and Petaluma creeks, an inflammable natural gas has been encountered in well boring operations, but no commercial supply developed.

Bibl.: R. VII, p. 181; XI, p. 458.

ONYX MARBLE.

(See *Healdsburg Marble Company,* under Magnesite).

OPALS (see Gems).

PAVING BLOCKS (See Stone Industry).

PETROLEUM.

There are some small outcrops of oil-stained sand (asphaltic base) on the Ducker ranch, three miles due east of Petaluma; elevation 280 feet (bar.). The Petaluma Oil and Development Company, M. S. Meeks, secretary, has a lease on the ground, but no work has been done since the spring of 1910. Under sublease from this company, the Ramona Oil

Company drilled three shallow holes and the Petaluma Home Oil Company one.

The log of well No. 1 was as follows:

Buff sand	65 feet
Blue clay	597 feet
Brown sand	38 feet
Blue clay	100 feet
Total depth	800 feet; gas struck

It is stated that the gas showed a pressure of 217 pounds and a flow of 690,000 cubic feet per 24 hours. It was utilized under the boilers in sinking the second well until the flow was cut off by the well clogging up.

The log of well No. 2 shows oil sands at depths of 335 to 340, 346 to 352, 397 to 399 feet, followed by a succession of shale, shell and gumbo strata to 910-foot depth. The strata exposed in the bed of a small creek about 300 feet west of the derrick show a strike east and west and a dip of about 40° to the south.

Oil seepages and gas are reported in Bennett Valley on the Parsons ranch, 7 miles due north from Petaluma.

Bibl.: Report XI, pp. 453–463; Bull. 69, p. 472.

QUICKSILVER.

Outside of the New Almaden mine in Santa Clara County, the Sonoma County quicksilver deposits (particularly those of the Pine Flat district) are among the oldest known in the state. They vary in character from the ordinary, mainly cinnabar-bearing ores, and the less common meta-cinnabarite, to the purely native mercury type as in the Rattlesnake and the Socrates. This last named group is found in the Pine Flat district, southeast of The Geysers; and has proven so far the most difficult to handle both from a mining and a metallurgical standpoint.

Prospecting and exploitation of the Pine Flat belt of deposits began in the early sixties and in 1861 some 33,000 feet of claims had been located on it (Geol. Surv. of Cal., Geology, Vol. I, p. 89). Among the claims being worked in that year were the Cincinnati, Dead Broke, Pittsburg, Pioneer (later renamed Socrates), and Denver. Though small amounts of quicksilver were produced by a retort from the Pioneer's native mercury ore, the result was not profitable from a pecuniary standpoint. The first definitely recorded output of quicksilver in the county was from the Sonoma mine in the same district in 1873 (Min. Res. West of the Rocky Mts., 1874, p. 30).

As will be noted from the table of mineral production (see page 144), there have been two principal periods of activity in the yield of quicksilver from Sonoma County mines—1874 to 1883 and 1888 to 1906. From 1882 to 1894, the Great Eastern mine was the only producer.

The total recorded output for Sonoma County to the end of 1913 was 61,407 flasks valued at $2,533,228. (For further descriptions as to market values, also metallurgy, see introduction to Quicksilver under Lake County.)

Bibl.: R. IV, p. 336; V, pp. 95, 96; VI, Pt. I, p. 102; VIII, p. 632; X, p. 675; XI, p. 460; XII, p. 371; XIII, pp. 602, 603; Bull. 20, p. 19; Bull. 27, pp. 97–117; GEOL. SURV. OF CAL., Geol., Vol. 1, pp. 88–91; U. S. G. S., Mon. XIII, pp. 362–364, 369, 376, 377; Min. Res. 1883, 1884, 1888, 1902, 1906, 1907, 1908, 1909, 1910, 1911, 1912, An. Rep. XVI, Pt. III, p. 598; XX, Pt. VI, p. 271; XXI, Pt. VI, p. 278; Trans. A. I. M. E., Vol. III, pp. 273, 275, 276, 290, 300, 304.

Almaden, Incandescent and Tunnel Site Group. These prospects near the Socrates mine have been abandoned several years. A 10-pipe retort was built.

Bibl.: Bull. 27, p. 97.

Altamont Copper Group. Quicksilver has been reported on these copper claims north of Camp Meeker, but no definite vein or ore body has been found.

Bacon Consolidated Group. On Pine Mountain. Abandoned.

Bibl.: Bull. 27, p. 97.

Big Chief Claim (see *Squaw*).

Black Bear Mine (see *Culver-Baer*).

Boston Group. These prospects about a mile east of the Pine Flat schoolhouse have been idle for the past 8 years. It is stated that a homestead has been lately filed on the land by Charles Acy.

Bibl.: Bull. 27, p. 97.

Bright Hope Mine. F. P. Tiran, Cloverdale, owner. This prospect is on an 80-acre piece of land held under an agricultural patent. It is on the Geysers road 15 miles east of Cloverdale, and 2 miles above the Cloverdale mine on the opposite side of Big Sulphur Creek; elevation 1475 feet (bar.). There are two crosscut tunnels on the stage road level, one in 180 feet and the other 450 feet. The latter attains a depth of 100 feet below the surface, and has drifts of 75 feet west and 60 feet east, also a 50-foot winze. The country rocks are sandstone and serpentine. The ore occurs partly in a ledge and partly as an impregnation in the sandstone. Both cinnabar and native quicksilver are present, with quartz as the principal gangue mineral, mixed with some serpentine. No ore has been taken out as yet except that in the course of development. There is no reduction equipment.

Buckeye Claim. F. Baumeister and George Hemenway, Cloverdale, owners. Elevation 2100 feet (bar.). This was formerly the Mt. Vernon claim of the Cloverdale group, which it adjoins, and was located by the present owners in 1910. Subsequent court proceedings confirmed their title to the ground, which it is intended to patent after this year's (1914) assessment work is done.

The ore-bearing zone is stated to be 100 feet wide and is made up of chert, impregnated sandstone, and stock-works, carrying cinnabar. This zone, which strikes northwest and southeast in the Cloverdale, turns abruptly to the south at the Squaw and Buckeye, crossing to the opposite side of Big Sulphur Creek; then turning again runs south of east through the Bright Hope, passing to the south of The Geysers and continuing southeasterly through the Socrates in the Pine Flat section. In the Cloverdale the dip is northeast at about 70°, east at the Buckeye, and southwest at the Socrates. While native mercury is a characteristic in the southern part of this zone, none is found in it north of Big Sulphur Creek. The Buckeye is being developed on three levels by an open cut and two tunnels, the lowest of which will give 200 feet of backs. There is a shaft of 50 feet and a tunnel of 300 feet, which were driven by the original locators. There are 200 tons of ore said to average 5 per cent, broken in the open cut.

Bibl.: Bull. 27, p. 99.

Cinnabar King Group. Cinnabar Mining Company, owners. Eli Bush, Healdsburg, treasurer. This group of 5 patented claims in Sec. 11, T. 10 N., R. 8 W., has been idle the past five years. The occurrence of ozocerite has been noted in this mine, associated with quicksilver.

Bibl.: R. XI, p. 461; XII, p. 371; XIII, p. 602; Bull. 27, p. 98; U. S. G. S. Min. Res., 1910, Pt. I, p. 701.

Cloverdale Mine. F. E. Johnston, Napa, and Harry Patten, Calistoga, owners. This group consists of the Cloverdale, already patented, and 5 other claims and a millsite which the owners are preparing to patent. The mine has had a somewhat intermittent history, having first been opened up in 1872. Its total production to the end of 1912 has been 5077 flasks, valued at $250,000. It is in Sec. 4, T. 11 N., R. 9 W., 12 miles east from Cloverdale, on the ridge between Big Sulphur and Squaw creeks, at their junction, the mine workings and reduction plant being on the slope toward the former. The topography is very steep, the elevation being 1000 feet at the furnace and 2200 feet (bar.) at the top of the ridge.

The ore body is characterized by "ledges of thinly stratified chert, inclosed by sandstone." The cinnabar occurs as "face metal" and incrustations in the fissures of the more compact chert beds, and as richer seams and bunches in the crushed portions. The chert is highly siliceous. The deposit has been opened up at several different levels, by both open cuts and tunnels. The earthquake of 1906 is stated to have disclosed the edge of an ore shoot in the "Glory Hole" cut, from which about $40,000 in quicksilver was produced. As a whole the underground workings are not very extensive, the major portion of the output having come from the open cuts. With topography decidedly in their favor, the ore is handled a surprisingly unnecessary number of times between the mine and the furnace. The latter, which is of 25 tons capacity, is an incline, tile furnace with reverberatory hearth.

The property has been idle the past two years except for a small tonnage of ore retorted, to "sample" the ore body. Mr. Johnston states they are not operating on account of the unsatisfactory labor situation and the low price of quicksilver.*

Bibl.: R. X, p. 675; Bull. 27, pp. 98–102, 215, 217; U. S. G. S. An. Rep. XXI, Pt. VI, p. 278; Min. Res. 1902, p. 253; 1907, Pt. I, p. 554; 1910, Pt. I, p. 701; 1911, Pt. I, p. 904; 1912, Pt. I, p. 944; MIN. RES. W. OF ROCKY MTS., 1875, pp. 14, 177; 1876, p. 20.

Clyde Mine (see *Culver-Baer*).

Crown Point Quicksilver Mining Company (see *Sonoma*).

Culver-Baer Mine, Culver-Baer Mining Company, owners; C. E. Humbert, president; J. P. Menihan, secretary; home office, Cloverdale. The holdings of this company now include, besides the Culver-Baer group, proper, the Black Bear, Clyde, Kentucky, Missouri and Sonoma groups. The last named group was bought about three years ago and its 24-ton Scott fine ore furnace removed to the Culver-Baer. With the exception of the Sonoma, these claims are at the head of Devil's Den, a branch of Little Sulphur Creek, in Sec. 23, T. 11 N., R. 9 W., 20 miles south of east from Cloverdale. The Culver-Baer group proper includes the old Geyser and Oakland mines, of early days, which were producers for several years previous to 1880. In 1875 the Oakland mine was producing 100 flasks per month with six retorts. The property is credited with a total production to the end of 1912 of 8154 flasks.

The topography is rugged; elevation 2200 feet (bar.) at the stable. The ledge is characterized by a bold outcrop of silicified sandstone with abundant yellow ochre, and is traceable on the surface for a mile in length. The vein filling is mostly quartz with some lime and chalcedony. The ore carries cinnabar, meta-cinnabarite and some native mercury. The ledge averages 100 feet in width but only 35 feet on the footwall is stoped. It strikes northwest, dips northeast on an average of 60° and has been drifted on, all told, for a length of 1200 feet. The hanging-wall is serpentine.

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*Since the above was written, we are informed that a concentration plant is being installed; also, the price of quicksilver has gone up on account of the European war.

The three main levels are the upper tunnel of 700 feet in length, the lower tunnel in 2000 feet, and 300 feet below, and an intermediate level which does not come to the surface. These two tunnels are connected by a raise from the 1200-foot point in the lower one. At the time the mine was visited (October, 1913) it was idle, only a watchman being retained; but since then a few men have been put on to drive a new raise, starting at 1960 feet in the lower tunnel. One stope from the No. 1 raise is 25 feet wide by 90 feet long and has 400 feet of backs. They have not yet reached the ground worked by the old company.

The equipment includes an air compressor driven by a 25 horsepower Fairbanks-Morse gasoline engine; also Cleveland stopers and an 8-inch by 10-inch jaw crusher. There is a 16-ton Knox Osborne coarse ore furnace, a 24-ton, Scott fine ore furnace and a retort. A small steam engine drives the furnace blower. A field kiln of 118,000 bricks for furnace work was burned three or four years ago from clay near the mine.

Bibl.: R. IV, p. 336 (table); V, p. 96; XI, p. 461; XII, p. 371; XIII, pp. 602, 603; Bull. 27, pp. 102–105, 113, 215; U. S. G. S. Mon. XIII, p. 377; Min. Res. 1902, p. 253; 1907, Pt. I, p. 680; 1908, Pt. I, p. 690; 1909, Pt. I, p. 554; 1910, Pt. I, p. 701; 1911, Pt. I, p. 904; 1912, Pt. I, p. 944; MIN. RES. W. OF ROCKY MTS., 1875, pp. 14, 175, 177, 493; TRANS. A. I. M. E. Vol. III, pp. 276, 304.

Crystal (see *Pacific*).

Double Star, near Pine Flat. Abandoned. No ore was found after considerable development.

Bibl.: Bull. 27, p. 105.

Eureka Mine (originally *Flagstaff*), Eureka Quicksilver Mining Company, owner; James B. Barber, 1421 High street, Oakland, president. This group of four claims and three millsites, part of which is patented, is in the Pine Flat district, in Sec. 32, T. 11 N., R. 8 W., about 25 miles by road northeast from Healdsburg and the same distance northwest from Calistoga. Outside of a small amount of prospecting work done as assessments to hold the unpatented claims, the property has been idle the past ten years. It is northwest of and adjoins the Socrates.

The ore body is on the contact between a serpentine hanging-wall and sandstone footwall, being in part altered and gouge material from both. Values occur as cinnabar, meta-cinnabarite and native mercury, about 50 per cent being native. There is one tunnel in about 1000 feet, giving 300-foot backs, and several other shorter ones above. The lowest tunnel has drifts of 250 feet and 100 feet, respectively. Another tunnel has been started at a still lower level. There is a 10-ton, modified Livermore-Fitzgerald furnace, a gasoline engine and a small compressor included in the equipment. A few flasks of quicksilver were produced in 1904.

Bibl.: Bull. 27, pp. 106-108; U. S. G. S. Mon. XIII, p. 376; MIN. RES. W. OF ROCKY MTS., 1875, pp. 14, 176.

Great Eastern Mine, Great Eastern Quicksilver Mining Company, owner; George Roeth, 125 Market street, Oakland, president. This mine is in Sec. 16, T. 8 N., R. 10 W., 4 miles northeast of Guerneville by a good road; elevation 360 feet (bar.). Production of quicksilver began here with an output of 412 flasks in 1875; and the mine is credited with a total output to date of 40,923 flasks, or about two thirds of the total output of Sonoma County to the end of 1912. This includes the yield of the Mt. Jackson mine adjoining, as the two were operated in conjunction for a number of years, and their individual figures are not separable. As has already been noted (see introduction to Quicksilver), from 1882 to 1894, the Great Eastern mine was the only producer in Sonoma County.

This Great Eastern-Mt. Jackson lode is peculiar because of its isolation from other workable quicksilver deposits and from any known eruptives. It resembles somewhat the Culver-Baer ledge with its bold, ochreous outcrop between a serpentine hanging-wall and sandstone footwall. The strike is north of west and dips north at 50° to 60°, being steeper at the surface. The Great Eastern vertical shaft is down 550 feet, with two winzes of 160 feet each sunk from the 500-foot level. There is also a 400-foot drift on the 500. The collar of the shaft is about 200 feet below the upper outcrop, and at that level there is a tunnel in 1100 feet, with connecting drifts and stopes in the ledge above. From the shaft there are levels at 150, 220, 360 and 500 feet, respectively.

The ore shoot is enclosed within the ledge of opalized rock which was originally probably mostly serpentine. Becker (U. S. G. S. Mon. XIII, p. 364) considers that this silicification "preceded the deposition of ore, though somewhat closely connected with it." Occasionally a little pyrite accompanies the cinnabar. There are also small seams of a hard bitumen associated with the ore body.

The geology is discussed in detail by Becker (op. cit.), and in Bull. 27 of the State Mining Bureau (pp. 108–112).

For several years previous to 1905 (in which year it expired), the Great Eastern Company had a lease on the Mt. Jackson ground adjoining and worked it through the Great Eastern levels. The earthquake of April 18, 1906, shook from the outcrop cliff near-by a large rock which rolled into the shaft, killing three men coming up in the cage. It also partially wrecked the shaft. The damage to the shaft has been repaired, but the mine has not been operated since. At the present time (January, 1914) they are investigating the practicability of concentrating the ore. There is an abundant water supply from several springs on the property.

The hoist is operated by a wood-burning steam plant. The crusher is at the hoist, and a gravity tram conveyed the ore to the furnaces. The reduction equipment includes a 4-ton coarse-ore furnace, a 16-ton Hüttner-Scott fine ore furnace and a ''D'' retort.

Bibl.: R. IV, p. 336 (Table); V, p. 95; VIII, p. 633; XI, p. 460; XII, 371; XIII, p. 602; Bull. 27, pp. 108–112, 226, 239, 246; U. S. G. S. Mon. XIII, pp. 362–364; An. Rep. XX, Pt. VI, p. 271; MIN. RES. 1883, pp. 394, 396, 397; 1902, pp. 251, 253; 1907, Pt. I, p. 680; 1908, Pt. I, p. 690; MIN. RES. W. OF ROCKY MTS., 1875, p. 14; 1876, p. 20; MINING AND SCIENTIFIC PRESS, Vol. 89, p. 391.

Great Northern. Abandoned.

Bibl.: Bull. 27, p. 112.

Hope Claims (see *Sonoma Consolidated*).

Hurley Prospect. Abandoned.

Bibl.: Bull. 27, p. 112.

Lookout Group. Abandoned.

Bibl.: Bull. 27, p. 113.

Lucky Stone Group. Abandoned.

Bibl.: Bull. 27, p. 113.

Maricoma Prospect (*Santa Rita*). Abandoned.

Bibl.: Bull. 27, p. 113.

Mercury Mining Company. F. A. Huntington et al., San Francisco, owners. For several years nothing but a small amount of assessment work has been done on these prospects in Secs. 32 and 33, T. 11 N., R. 8 W., near the Socrates mine.

Bibl.: Bull. 27, p. 113, U. S. G. S., Min. Res. 1902, p. 252; MIN. RES. W. OF ROCKY MTS., 1875, p. 14.

Missouri Mine (see *Culver-Baer*).

Mt. Jackson Quicksilver Mining Company, O. T. Hassett, Geyserville, R. F. D., president. This mine adjoins the Great Eastern mine (*q. v.*) near Guerneville on the northwest, but has no plant of its own, having been worked for a number of years through the Great Eastern levels. It has been idle since 1905.

Bibl.: R. VIII, p. 633; XII, p. 371; XIII, p. 602; Bull. 27, pp. 108–112.

Napa Prospect. Abandoned.

Bibl.: Bull. 27, p. 113.

Occidental and Healdsburg Group. Abandoned.

Bibl.: Bull. 27, p. 114.

Old Chapman Prospect. Abandoned.

Bibl.: Bull. 27, p. 114.

Pacific Group (*Crystal or Red Cloud*), A. Abbey, George Roeth et al., Oakland, owners. They consist of four patented claims in Secs. 5 and 6, T. 10 N., R. 8 W., near the Sonoma group in the Pine Flat section. No work has been done for several years. A watchman only is employed.

Bibl.: R. XIII, p. 603; Bull. 27, p. 114; U. S. G. S., Min. Res. 1902, p. 253.

Pontiac Group (see *Socrates*).

Rattlesnake Mine. Parrott Estate et al., San Francisco, owners. This mine is in Sec. 31, T. 11 N., R. 8 W., on the road between the Culver-Baer and the Sonoma mines. It is credited with a production of 65 flasks in 1875, entirely from native quicksilver. Not only was the metal entirely in the native state, but it is claimed that there was so much mercurial vapor in the underground workings that if a lunch bucket were left in over a day or two, the solder would become amalgamated and the bottom drop out. The mine has been idle for years, and is now inaccessible. Like the Socrates, the difficulty here was to handle the native metal economically. If the underground situation could be handled successfully and safely, it would seem that the ore-dressing end might be solved by some system of concentrators or hydraulic settlers.

Bibl.: R. IV, p. 336 (table); XIII, p. 603; Bull. 27, p. 115; U. S. G. S., Mon. XIII, p. 377; MIN. RES. W. OF ROCKY MTS., 1874, p. 37; 1875, pp. 14, 176; TRANS. A. I. M. E., Vol. III, p. 273.

Red Cloud Claim (see *Pacific*).

Santa Rita Claim (see *Maricoma*).

Socrates Mine (originally *Pioneer*). Socrates Consolidated Mining Company, owner; L. T. Carr, 412 Montgomery street, San Francisco. This group of patented claims is at the junction of Secs. 32 and 33, T. 11 N., R. 8 W., and Secs. 4 and 5, T. 10 N., R. 8 W., on the divide between Big Sulphur and Little Sulphur creeks, 6 miles southeast of The Geysers. The Pioneer of this group was the first quicksilver claim located in Sonoma County. It is in the Pine Flat section. Owing to the difficulty of handling the native metal which makes up the major portion of the values here, the mine was idle for many years. The occurrence of selenide of mercury has also been noted in the Socrates. During its last period of operation attempts were made to recover the quicksilver with a rotary roasting furnace. Their surface plant was destroyed by a forest fire in the fall of 1907. During 1908 and 1909, the Socrates Development Company, operating the property under bond, made a small output of quicksilver, employing a Huntington mill and a Woodbury concentrator. The concentrates were retorted. Since that time the mine has been closed, only a watchman being employed.

Bibl.: Bull. 27, p. 115; U. S. G. S., Mon. XIII, p. 376; Min. Res. 1902, p. 253; 1906, pp. 493, 497; 1907, Pt. I, p. 680; 1908, Pt. I, p. 690; 1909, Pt. I, p. 554; 1910, Pt. I, p. 701; GEOL. SURV. OF CAL. Geol., Vol. I, pp. 88–91; MIN. RES. W. OF ROCKY MTS., 1875, pp. 14, 177; MINING AND SCIENTIFIC PRESS, Vol. XC, p. 22.

Sonoma Consolidated Group (Crown Point and Hope). This group in Secs. 4 and 5, T. 10 N., R. 8 W., Pine Flat district, is now owned by the Culver-Baer Company (*q. v.*). This company bought the property particularly for its surface equipment, which has been transferred to the Culver-Baer mine 5 miles to the northwest. The Sonoma was last operated by the Crown Point Company. Production began with an output of 50 flasks in 1873.

Bibl.: R. XIII, p. 503; Bull. 27, pp. 102, 112; U. S. G. S. Mon. XIII, p. 377; Min. Res. 1902, p. 253; MIN. RES. W. OF ROCKY MTS., 1874, p. 30; 1875, p. 14; TRANS. A. I. M. E., Vol. III, p. 290.

Squaw and Big Chief Claims. L. D. Kissack and John June, Cloverdale, owners. These claims are in Sec. 4, T. 11 N., R. 9 W., adjoining the Cloverdale mine, 12 miles east from Cloverdale; elevation 2200 feet (bar.). The ore is similar to that of the Cloverdale. A tunnel and a short incline from it have been driven in about 60 feet, and a few sacks of high grade ore sorted from the material taken out. It is intended to patent the Squaw soon.

Walker Prospect. On patented ground near Guerneville, owned by M. C. Meeker, of Camp Meeker. A few stringers carrying cinnabar are said to have been found, but nothing of consequence developed.

Bibl.: Bull. 27, p. 116.

Wall Spring Prospect. H. C. Wall, Hilton, owner. Idle.

Bibl.: Bull. 27, p. 117.

STONE INDUSTRY.

The stone quarries' products have been one of Sonoma County's most important assets for many years. The majority of the paving blocks employed in street work in the cities of the state have come from the quarries of this county. For a considerable period this particular branch was much more prominent than it is at the present time, and gave employment to several thousand men. Following the San Francisco fire of 1906, the demand for paving blocks was good for a time and the year 1912 was a prosperous one; but the Block Makers' Union demanded raises in the contract price successively from $25 to $30, then to $35 per 1000. This, coupled with the increasing number of motor driven vehicles and their demand for a smoother pavement, caused a heavy slump in the business. As a consequence, the year 1913 saw operations at many of the quarries shut down altogether, while others were curtailed to the output of only a few men. It is stated that one man will make an average of 100 to 150 blocks per day. At the time they were visited (October, 1913) there were approximately 1,600,000 blocks piled up at the various quarries and at the railroad shipping points, awaiting a market.

In addition to the $35 per 1000 for making, those operators who are leasing pay $3 to $3.50 per 1000 royalty to the owners. It costs from $2 to $5 per 1000, depending on the distance, to haul them to the railroad. In case they can not be loaded directly onto the cars but have to be temporarily piled beside the track, it costs an additional $1.50 per 1000 to put them on the cars. The blocks sell at $45 to $50 per 1000, f. o. b. the rail shipping point.

Though they are loosely designated by the trade as ''basalt blocks,'' the rock for the most part is andesite. Particularly is this the case along the ridge which starts above Rincon Valley, northeast of Santa Rosa, and trends southeasterly to near Kenwood. Locally, in places, it grades to basalt, and at others to trachyte. This stone is also employed for making curbing, and as such was erroneously reported for a number of years under the head of ''granite'' (as has already been noted. See under *Granite*).

The following table gives the production of paving blocks for Sonoma County, from 1887, though the Petaluma quarry was worked as early as 1864:[1]

Table of Paving Block Production.

Year	Thousand	Value
1887	10,000	$350,000
1888	10,500	367,500
1889	[2]7,303	297,236
1890	[3]7,000	245,000
1891	[3]5,000	150,000
1892	3,000	96,000
1893	2,900	92,800
1894	2,217	56,881
1895	2,136	67,808
1896	3,679	61,092
1897	1,295	28,035
1898	704	13,310
1899	200	3,780
1900	1,042	20,275
1901	1,690	32,675
1902	2,866	82,227
1903	3,879	80,492
1904	2,163	65,197
1905	2,145	66,785
1906	3,071	128,444
1907	2,698	112,797
1908	5,226	228,630
1909	3,006	134,223
1910	3,429	153,810
1911	3,278	162,392
1912	5,781	264,677
1913	2,761	126,747
Totals	98,969	$3,488,813

[1] Tenth U. S. Census Report, Vol. X, Pt. 3, pp. 97, 279.
[2] Eleventh U. S. Census, Report on Mineral Industries, p. 605.
[3] Estimated.

At a number of the quarries the spalls and waste from block-making operations are utilized for crushed rock for macadam and concrete work. In addition to the igneous rocks already mentioned, there is a tuff east of Freestone and sandstone along the coast from Fort Ross to Stewart's Point. The latter are undeveloped (R. X, p. 678; XI, p. 462; XII, p. 400; XIII, p. 638; Bull. 38, p. 141).

Aguillon Quarry, C. Aguillon, owner. It is ½ mile north of Sonoma, adjoining the Vallejo Estate. Idle.

Bibl.: Bull. 38, p. 162.

Annadel Quarry (see *Hutchinson*).

Bacigalupi Ranch (*Norris;* also *Roy Bert*), N. Bacigalupi, Santa Rosa, owner. On this place in Rincon Valley northeast of Santa Rosa, are several quarry pits (one formerly known as Norris quarry) from which paving blocks were made for several years. A few were made in the spring of 1913, but none shipped during the year.

Bibl.: Bull. 38, pp. 343, 344, 345.

Barbera Quarry, Antonio Barbera, R. R. No. 6, box 89, Santa Rosa, owner. This is a small quarry on the Rincon Valley road near its junction with the Santa Rosa-Sonoma road, 2½ miles east of Santa Rosa. It is on land adjoining the vineyard of the same owner, who makes a few paving blocks a day, working at odd hours.

Barnes Quarry (see *Craig*).

Beason Quarry (see *Lichau*).

Boca Quarry. F. Boca et al., Glen Ellen, owners. This quarry, 1½ miles east of Glen Ellen, has been idle the past two years.

Bibl.: R. XII, p. 396; XIII, p. 634; Bull. 38, p. 343.

Borg Quarry (see *Hutchinson ranch*).

On the *H. Calleaud* place at Buena Vista, 2 miles east of Sonoma, some stone was being taken out in 1913 by J. Newman, of Napa, for the new county bridge at Shellville.

Carpenter Quarry (see Clough).

John Cassaretto, of 345 Berry street, San Francisco, takes gravel from Sonoma Slough below Sonoma by means of a suction dredge, working mainly during high tides. The gravel is loaded into barges or scow schooners and carried to San Francisco, where it is screened. The dredge has a capacity of 200 to 300 cubic yards per day.

City Improvement Company (see *Violetti*).

City Street Improvement Company (see McDonald).

Claasen Quarry. Mrs. J. P. Claasen, R. F. D., Petaluma, owner. This quarry, south of town and adjoining the Petaluma Rock Quarry, has been idle for several years.

Bibl.: Bull. 38, p. 326.

Clough Quarry (*Carpenter*). M. S. Clough and Mrs. Young, Petaluma, owners; L. Green, manager. It is on the west edge of Petaluma, and is operated intermittently by the county under lease for road metal. The rock is principally andesite, in part grading to basalt, and varying in color from red to black. There are two faces, at the newer one of which the leasers have a No. 3 Austin gyratory crusher and a 25 h.p. gasoline engine, both on portable frames. There is a bucket elevator to the bin, but no screens.

Clute Quarry (see *Titania*).

Cooney Quarry. J. Cooney, Petaluma, owner. It is 2 miles east of Penn Grove. Idle for several years past.

Bibl.: R. XII, p. 396; XIII, 634; Bull. 38, p. 343.

Photo No. 139. Coutts Bros.' paving block quarry, Kenwood, Sonoma County, California.

Coutts Bros. Quarry (one time called *Maroni*), Sonoma Farms Company (Grace Bros.), Santa Rosa, owners; J. L. Coutts & Company, Kenwood, lessees. This paving block quarry is 1¼ miles northeast from Kenwood station; elevation 800 feet (bar.). It is near the top of and partly encircles a steep hill, being visible from the valley for several miles around. (See photo No. 139.) The present portion of the quarry was opened up by Coutts Brothers in January, 1910, though Maroni had operated here some years previously. The rock, which is a hornblende andesite grading in places to a basalt, is mostly massive breaking into blocks 10 feet to 15 feet through. The quarry extends for about a quarter of a mile around the hill with faces up to 50 feet high. Up to July, 1913, they had 40 to 50 men at work, since when but 6 have been kept on.

Bibl.: R. XII, p. 397; XIII, p. 635.

Craig Quarry (formerly *Barnes*), D. N. Craig, Penn Grove, owner. The quarry is on a low rounded ridge 1½ miles northeast from Penn Grove; elevation 150 feet. The stone is a dark gray, medium grained basalt, with hornblende phenocrysts. There is considerable vesicular material. Principally curbing is made, though formerly a large number of paving blocks were turned out. The curbing blocks are 10 inches deep by 5 inches wide and 11 inches long (requiring 92 per running foot). The men are paid 9 cents per running foot for the making, and the blocks sell for 10½ cents per foot. The output is all sold in Petaluma. Two men were employed during 1913.

In addition to curbing, Craig also sells gravel to the county for road work, from Petaluma Creek on another part of the same ranch.

Bibl.: R. X, p. 678; XII, p. 396; XIII, p. 634; Bull. 38, p. 343.

Cronin Quarry (see *Petaluma Rock*).

Davis Quarry, Henry Davis et al., Penn Grove, owners. Two miles east of Penn Grove. Idle for 12 or 13 years.

Bibl.: R. XII, p. 397; XIII, p. 634; Bull. 38, p. 343.

Dickinson Quarry, northeast of Petaluma. Idle for some years.

Bibl.: R. XII, p. 397; XIII, p. 634; Bull. 38, p. 343.

Elliott Quarry (see *McDonald*).

Fairville Quarry and Gravel Company, A. W. Foster, Jr., Flood Building, San Francisco, manager. This quarry at Quarries post office on the Northwestern Pacific Railroad, near Fairville, was opened up in 1907, and for a time produced at the rate of 5000 cubic yards of crushed rock per month; but it has been idle since 1910 owing to high freight rates. The product sold for 75 cents per ton f. o. b. Quarries, either on cars or barges (via Sonoma Creek). The equipment includes a No. 5 McCully crusher and a No. 2 Austin, with an oil burning steam plant.

Flinn & Treacy (see *Hutchinson Ranch*).

Frugoli Quarry, G. Frugoli, owner. It is on the Rincon Valley road, 6 miles northeast of Santa Rosa. Paving blocks. Idle.

Bibl.: Bull. 38, p. 343.

Gravel for road work throughout the county is obtained at the most convenient nearby point, and is under the direction of each supervisor in his district. Along the Russian River it is taken out free, while on the creeks the land owners are paid 10 cents to 25 cents per load (about 2 cubic yards).

Gray Quarry, J. W. Gray, 208 Lincoln street, Santa Rosa, owner. This paving block quarry is on the Rincon Valley road, in Sec. 6, T. 7 N., R. 7 W., 3 miles northeast from Santa Rosa. Block making began here in 1908, and in the spring of 1913 there were 12 to 15 men at work. Later, however, the quarry was idle, but it is intended to resume with a few men.

Hardin Quarry, J. M. Hardin, Petaluma, owner. This paving block quarry east of Penn Grove has been idle 10 years.

Bibl.: R. XIII, p. 634; Bull. 38, p. 344.

Harney Quarry (see *Melitta*).

Hill Quarry, Mrs. Josephine Hill, and E. B. Hill, Petaluma, owners. There is a crushing plant at this quarry near Petaluma. Idle since 1911.

John Hugert, of Agua Caliente, has been working a small paving block quarry on the J. Bower ranch 3 miles east of Melitta. Idle in 1913.

Bibl.: Bull. 38, p. 344.

Hutchinson Ranch Quarries (*Borg, Oleson, Annadel, Flinn & Treacy*), Thomas Hutchinson, Santa Rosa, owner. There are several quarries on this property east of Santa Rosa. E. and J. B. Laurent, of Kenwood, are operators on the Annadel group, shipping via Annadel siding on the Southern Pacific Railroad; while Flinn & Treacy, of San Francisco, have the Borg or Oleson quarries, shipping from Oleson siding. The quarries are at an elevation of about 800 feet. There are 3850 acres in the property, of which about 1000 acres have stone suitable for quarrying. The rock is principally a dark gray andesite; but grading in part to a black, fine-grained basalt. There is also some vesicular material.

Borg first opened up the Oleson quarry about 1893. Flinn & Treacy bought 15 acres of this which they worked out and they are now operating on a royalty basis on the west end of the ranch. They made an average of over 250,000 blocks per year, for 12 years up to the beginning of 1913; but when visited (October, 1913) there were only three men employed.

Laurent Brothers have been working the Annadel quarries for about seven years, previous to which they were about 15 years on the Wymore property at Melitta. During 1912 they shipped 200,000 blocks per month for several months, but were idle in 1913.

Bibl.: R. X, p. 376; XI, p. 463; XII, p. 396; XIII, p. 634; Bull. 38, pp. 343, 344.

Kellas Quarry (see *McNeill*).

Laurent Brothers (see *Hutchinson Ranch*).

Lawndale Quarry (formerly *Stacy*), Lawndale Forward Movement Syndicate, owner; T. S. Fritz, president; M. B. Sheehan, secretary; home office, 346 Monadnock Building, San Francisco; post office, Kenwood. There are several quarry openings on this ranch, 3 miles northwest from Kenwood, some of which have been worked by leasers, and some by the company. Except for one lease with two men employed, they were idle the last half of 1913. Both andesite and basalt occur, the latter showing a little olivine. The present company took over the property in 1909, principally for the purpose of growing eucalyptus trees for wood and lumber. It is stated that up to 1913 they had planted 110,000 trees. The shipping point is Lawndale switch on the Southern Pacific Railroad.

Bibl.: R. XI, p. 463; XII, p. 397; XIII, p. 635; Bull. 38, p. 345.

Lichau Quarry (*Beason*), A. C. Lichau, owner; 4 miles northeast of Penn Grove. Idle for years.

Bibl.: Bull. 38, p. 344.

Lounibos Quarry (one time *Cady*), W. C. Booth, 2220 Ashby avenue, Berkeley, owner; John Newman, Napa, lessee. This quarry of trachytic tuff in Sec. 36, T. 6 N., R. 5 W., about a mile east of Agua Caliente, is operated intermittently. The lessee was taking out stone (October, 1913) for the new county bridge at Shellville south of Sonoma. Stone from this quarry is also employed for curbings and other uses in the cemetery at Sonoma. There is a black vitrophyre associated with this tuff. They are apparently from the same magma, but cooled at different rates. One large boulder was found showing both phases, and grading into each other. This vitrophyre is the ''granite'' referred to in Bull. 38, p. 376.

Bibl.: Bull. 38, p. 162.

Lynch Quarry, John Lynch, Petaluma, owner; 6 miles east of Petaluma near the Hardin ranch. Idle for years.

Bibl.: R. XIII, p. 634; Bull. 38, p. 344.

Madison Quarry, Hans Madison, R. R. No. 5, Box 196, Santa Rosa, owner. This is a small paving block quarry, 2 miles east of Santa Rosa, across the road from the Titania quarry; elevation 300 feet (bar.). The owner works it single-handed intermittently.

On the *Mahoney Brothers* place on the Two Rock road west of Petaluma small amounts of rock are taken out occasionally for road work. It is a partly disintegrated material.

H. C. Manuel formerly operated a paving block quarry under lease on the English and Burnett ranch at Kenwood, but is now leasing on the Vallejo Estate (q. v.) at Sonoma.

Bibl.: R. XII, p. 397; XIII, p. 634.

Maroni Quarry (see *Coutts;* also *Titania*).

McDonald Ranch Quarries, C. D. Barnett et al., 629 Fourth street, Santa Rosa, owners. These quarries are at and south of Baku switch, 2 miles east from Santa Rosa. They are among the oldest in the county, having been opened up by McDonald in 1880. Until the railroad was built down the Sonoma Valley, the blocks were hauled to Santa Rosa for shipment. The ''Elliott'' quarry is included in this group. The City Street Improvement Company operated these quarries from 1891 to 1913, when their lease expired. In October, 1913, they still had about half a million blocks at Baku siding waiting shipment. In 1906 they had 100 men at work, and in earlier years a greater number. C. Lawrence and J. Percy each have leases on small areas of the property and are making a few blocks (October, 1913). All told many millions of paving blocks have come from this property.

The quarry pits are in a low, flat-topped ridge, elevation 350 to 400 feet (bar.); and the rock is a dark gray andesite. Matthews & Company, under a lease, have put up a rock crushing plant of about 30 tons per day capacity to utilize the spalls and waste for macadam and concrete work. They have a 20 h.p. electric motor, 16″ x 24″ jaw crusher, revolving screen and bins for three sizes of product. Stone from this place was used in the following buildings in Santa Rosa: Northwestern Pacific Depot, St. Rose Church (1900), Carnegie Library (1903).

Bibl.: R. VIII, p. 635; X. p. 675; XII, p. 396; XIII, pp. 634, 635; Bull. 38, pp. 163, 343, 344, 345.

McNear's Quarry, McNear Company, Petaluma, owner. This is a small quarry at the north end of Main street. The rock is basalt, in part weathered and disintegrated, and a few loads are occasionally taken out for road work.

Bibl.: Bull. 38, p. 326.

McNeil Ranch Quarry (*Kellas;* also *Wilkinson*), F. Riebli et al., lessees. It is near Penn Grove. Idle in 1913.

Bibl.: R. XII, p. 397; XIII, p. 635; Bull. 38, p. 345.

On the *F. Meacham Ranch* on the Sebastopol road northwest of Petaluma, rock is occasionally obtained for road work. It is a somewhat soft and broken up material.

Bibl.: Bull. 38, p. 327.

Melani Quarry, Melani Estate, owner. It is a small quarry adjoining the Schocken quarries at Sonoma. Idle past ten years.

Bibl.: Bull. 38, p. 344.

Melitta Stone Quarries (*Wymore;* also *Harney*), C. C. Wymore, R. F. D. No. 5, Santa Rosa, owner; W. W. and G. H. Wymore, Anglo Building, San Francisco, lessees. This group of quarries is 1 mile south from Melitta, 6 miles east of Santa Rosa, at an elevation of 900 feet (bar.). These large cuts (see photo No. 142) are visible from Santa Rosa. Operations were first begun here about 1888 by the Laurent Brothers, who continued for 15 years, and the present lessees since then. During the 9 years to 1913 production was at an average rate of 100,000 blocks per month. Idle since April, 1913.

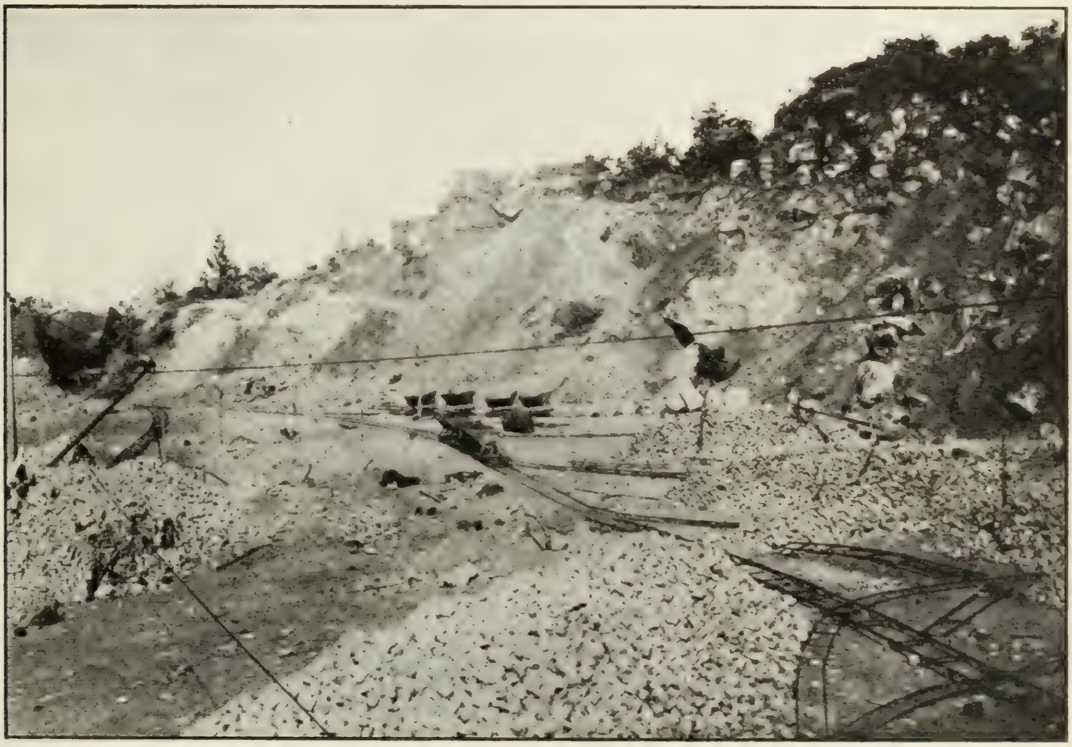

Photo No. 142. Paving blocks. Melitta (Wymore) stone quarry, Melitta, Sonoma County, California.

There is a gravity tramway of 3200 feet which delivers the paving blocks in side-tipping cars to bunkers at the railroad. The rock, which is a medium-grained, gray olivine basalt, occurs principally in the form of boulders, the result of concentric decomposition. On a field examination only it might be mistaken for a trachyte or an andesite, because of its light color and the fact that the olivines are largely altered; but the microscope shows it to be a basalt.

Bibl.: R. X, p. 676; XI, p. 463; XII, p. 397; XIII, p. 634; Bull. 38, p. 345.

Mt. Pisgah Quarry (see *Petaluma Rock*).

Natomas Consolidated of California (formerly *Schocken*), Natomas Consolidated of California, Alaska Commercial Building, San Francisco, owner. This quarry (or rather series of quarries) is on a steep hill ½ mile north of Sonoma; elevation 400-500 feet (U. S. G. S.); and was first opened up in 1876. In 1880 it was bought by S. Schocken who operated it up to 1909, when the present owners took it over. About 1888, an average of 100,000 paving blocks per month were shipped from here, with 60 men at work. Some curbing and small dimension building stone have also been produced. Only two men were working, October, 1913.

The rock is a gray andesite, some of it having abundant, white feldspar phenocrysts. The surface of the hill near the summit is extensively potholed, with openings from a few square feet to one over an acre in extent and with a 100-foot bank. It is stated that the Natomas bought the property as a source of supply for crushed rock, as the spall piles are numerous and extensive. This feature has not yet been developed. In the early days of this quarry before the advent of the railroad, the paving blocks were hauled in wagons to the Embarcadero on Sonoma Creek, where they were loaded on barges.

Bibl.: R. VIII, p. 635; XI, p. 463; XII, p. 397; XIII, p. 635; Bull. 38, p. 345.

Norris Quarry (see *Bacigalupi*).

The *Northwestern Pacific Railroad Company*, has a gravel pit on the Russian River at McCray station north of Cloverdale. Some gravel for ballast was taken out in 1913.

Oleson Quarry (see *Hutchinson Ranch*).

Pedroncelli Quarry, F. Pedroncelli, owner. It is near Kenwood, but has not been worked for a number of years.

Bibl.: Bull. 38, p. 344.

Petaluma and Santa Rosa Electric Railway Company (see *Stony Point*).

Petaluma Municipal Rock Crusher, Conway Brothers, Petaluma, owners; City of Petaluma, lessee. This quarry near the west end of B street, was opened up and equipped by the city in January, 1910, under a lease, with privilege of removing plant at termination of lease. The rock, which is a black, close-grained basalt with some olivine and augite phenocrysts, occurs somewhat fractured, producing angular blocks up to three feet across. The quarry is worked only during the summer months. The product is screened to No. 1, No. 2, and No. 3 sizes and "dust." Electric power is used.

The following is an extract from the report of F. B. Singley, city auditor of Petaluma, for the fiscal year 1912-1913:

"The rock crusher account from the beginning (January, 1910) to June 30, 1913. Summary as follows:

DEBIT.		
Plant and tools to June 30, 1913		$11,458 75
Operating expenses to June 30, 1913—		
Labor	16,637 25	
Supplies	3,398 32	
Power	1,192 05	
Royalty	1,654 21	
Sundries	599 64	
Total	$23,481 47	
CREDIT.		
Crushed rock sold to June 30, 1913, 22,387.4 cubic yards for	$22,124 96	
	$1,356 51	

"Against this adverse balance of $1,356.51 in the operating expenses: The city has used on her streets 5,009.2 yards; and there were in the bunkers June 30, 1913, 480 yards; a total of rock crushed, 27,876.6 yards; which cost exclusive of the plant, $84\frac{1}{4}$ cents per yard.

"The 22,387.4 yards sold brought $98\frac{4}{5}$ cents per yard; and the total used by the city and on hand of 5,489.2 yards, cost the city $1,356.51, or $24\frac{3}{4}$ cents per yard, exclusive of the plant.

"Previous to the installing of city crusher, the city and contractors paid $1.25 per yard for rock."

Petaluma Rock Quarry (*Cronin;* also *Mt. Pisgah*), P. Cronin, Petaluma, owner; E. B. & A. L. Stone, 401 Phelan Building, San Francisco, lessees; F. L. Marty, superintendent at quarry. One time leased to Union Construction Company. This quarry in Sec. 3, T. 4 N., R. 7 W., $1\frac{1}{2}$ miles south of Petaluma, was opened up in 1864 (10th U. S. Census Report, Vol. X, Pt. 3, p. 279). It is at tidewater on Petaluma Creek (one time called Rudesill's landing), and at McNear's spur on the Northwestern Pacific. The rock is basalt with fine, white feldspar phenocrysts.

Previous to 1890 this quarry was worked for paving blocks, but at present solely for crushed rock. In the quarry face the material is shoveled to cars and trammed to the screen which takes out the clay; then by gravity tram (in balance) to crushers (see photo No. 164). From this point a belt conveyor carries it to the revolving screen, four sizes being made: $\frac{5}{16}$, $\frac{3}{4}$, $1\frac{1}{4}$, 2 inches. A 30 h.p. electric motor dump-car of 4 cubic yards capacity transfers the product to the various storage bins. The plant has a capacity of 7000 tons per month, and the bunkers will hold 2000 tons of rock.

A new quarry face was being started (October, 1913), at the crusher level, which will do away with the gravity tram above. Nine men were at work, but 28 are required when in full operation. This quarry in 1913 supplied rock for the State Highway near Ukiah.

Bibl.: R. V, p. 108; VI, Pt. I, p. 27; X, p. 678; XI, p. 463; XII, p. 397; XIII, p. 634; Bull. 38, p. 345; 10TH U. S. CENSUS REP. Vol. X, Pt. III, pp. 97, 279.

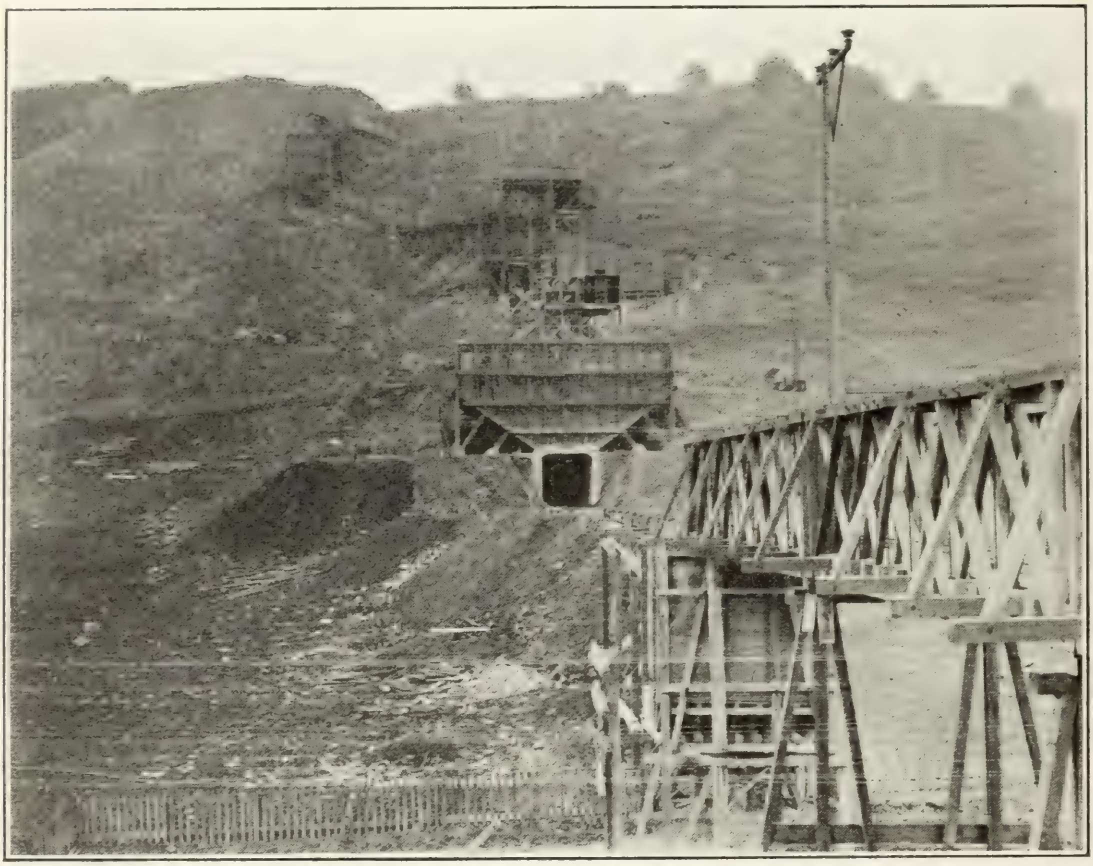

Photo No. 164. Plant at Petaluma Rock Quarry (E. B. & A. L. Stone Company), near Petaluma, Sonoma County, California.

Lorenz Pietzoli has a small paving block quarry near Gray's on the Rincon Valley road northeast of Santa Rosa, which he works single-handed.

Purrington Quarry, 1¾ miles southwest of Petaluma. Idle several years, except for an occasional load.

Bibl.: Bull. 38, p. 327.

On the W. D. Reynolds property, 2 miles east of Santa Rosa is a quarry equipped with a crushing plant, for a time leased by D. C. Albers. Idle past two years.

A. Rigoni has a small paving block quarry, adjoining Frugoli, on the Rincon Valley road northeast of Santa Rosa.

Roberts Quarry, Mary E. Roberts, Penn Grove, owner. This is 2 miles east of Penn Grove, but has been idle since 1910. When last operated, two men worked about three years on curbing and paving blocks.

Bibl.: R. XII, p. 397; XIII, p. 635; Bull. 38, p. 345.

Roblar Mining Company, J. A. Ronsheimer, Petaluma, president. Garrett Hyatt, R. F. D., Petaluma, secretary. It is at Roblar station on the Petaluma and Santa Rosa Electric Railway, 11 miles north of Petaluma; elevation 175 feet (bar.). There is a quartz vein here 12 to 15 feet wide, in serpentine; strike south of west, and dip north nearly vertical. It has been worked by open-cut and mill hole and by chambering. A cross-cut adit has been run in 300 feet, then drifts 300 feet west and 100 feet east. To the west, the vein appears to be cut off by a fault, and to the east it splits up into several small stringers. The quartz is crushed with rolls, then sized with shaking screens to four sizes: No. 5 mesh to No. 6; No. 6 to No. 10; No. 10 to No. 22; through No. 22. The three larger sizes are sold for chicken grit, and the fines for plaster work and to painters for sanding. This quartz is said to carry some small values in gold and copper.

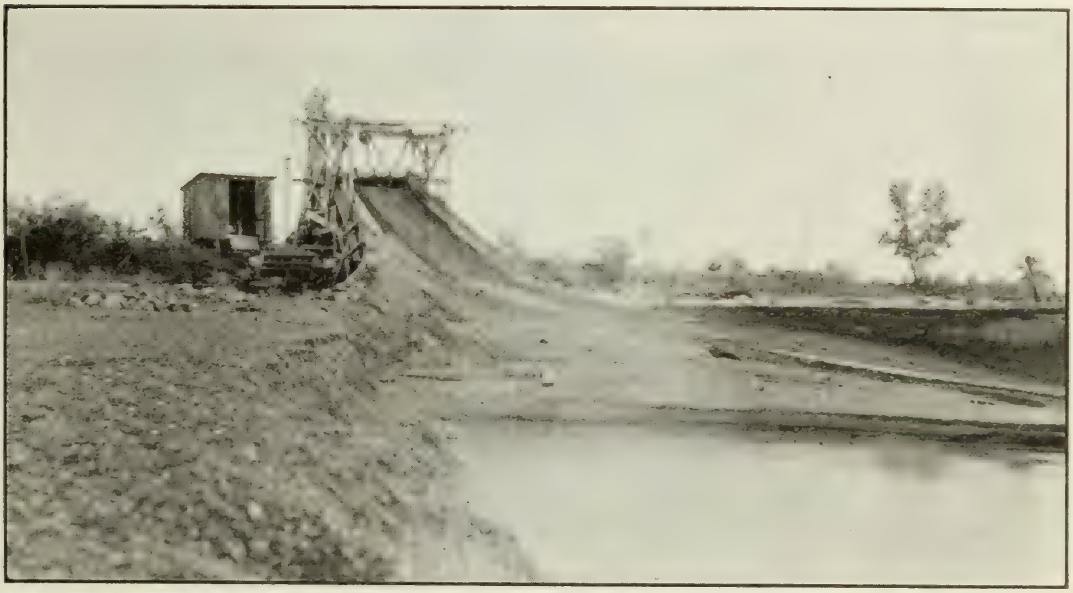

Photo No. 155. Drag-line excavator of Russian River Gravel Company, Healdsburg, Sonoma County, California.

Roy Bert Quarry (see *Bacigalupi*).

Russian River Gravel Company, J. D. Grant, Williams Building, San Francisco, owner; J. F. Bailache, Healdsburg, superintendent. This plant is on a gravel bar on the Russian River $\frac{1}{4}$ mile east from Healdsburg station with which it is connected by a Northwestern Pacific spur track. The first plant was built in 1906 and the present enlarged one in October, 1911. A 3-cubic-yard drag-line scraper (see photo No. 155) raises the gravel to a revolving screen (1½-inch aperture), and the oversize is crushed.

The material is then hauled by cable in side-tipping cars to the upper plant where it is screened to "sand," "roofing" (¾-inch ring) and "rock" (¾-inch to 1½-inch). Electric power is used. The "roofing" sells for $1 per ton at the plant, and the "rock" at 35 cents. Railroad cars can be run directly to the lower bins as well as the upper plant. In 1913, they were supplying gravel for the State Highway between Healdsburg and Santa Rosa. The screening plant has a capacity to load eight railroad ballast cars per day. The gravel is made up of Coast Range rocks, principally quartz, chert and hard sandstone.

Santa Rosa Bank Quarry (see *Titania*).

Santa Rosa Basalt Rock Quarry (see *McDonald*).

Schocken Quarry (see *Natomas*).

Sonoma City Rock Crusher. The city of Sonoma owns this plant, which is situated on land leased for quarrying purposes from the Vallejo Estate, ½ mile north of Sonoma. It was built in 1910. There is a 30 h.p. electric motor, bucket elevator, jaw crusher and screen (3 sizes); capacity 50 to 75 yards per day. The plant is subleased to R. E. Murphy, who furnishes rock to the city for 85 cents per cubic yard. A royalty of 5 cents per cubic yard is paid the owner.

Stacy Quarry (see *Lawndale*).

Stone, E. B. and A. L. (see *Petaluma Rock*).

Stony Point Quarry. Petaluma and Santa Rosa Electric Railway Company, owner; E. M. Van Frank, president; E. T. McMurray, secretary; operating office, Petaluma. It is at Quarry Station, about halfway between Sebastopol and Petaluma; elevation 220 feet (bar.). The earliest settlers used this rock for fireplace construction, but it is now used only for ballast and road metal. The waste is used for fills. The rock is a light, greenish to yellow trachytic tuff. A 70 h.p. electric motor runs the plant and a No. 5 Allis-Chalmers gyratory crusher is used. There are no screens. It is operated principally in the summer, with 18 to 20 men. Capacity 200 cubic yards per day.

Stone from this quarry was employed in the bank at Sebastopol and the Carnegie Library (1904) at Petaluma (see photo No. 163); also the front of the Phoenix Block on Main street, Petaluma, built in 1858. The copings of this oldest building still have sharp edges, and the structure has survived two earthquakes and a fire on both sides of it.

Bibl.: R. XII, p. 405; Bull. 38, p. 163.

Swank Quarry (see *Titania*).

Titania Quarry (*Clute*; *Swank*; also *"Santa Rosa Bank"*). P. Maroni, 925 Ripley street, Santa Rosa, owner. This quarry, 2 miles east of Santa Rosa, was first opened up in 1885 by Clute and, up to seven years ago when the present owner took it over, produced only paving blocks and building stone. At present, besides crushed rock, some curbing and small dimension stone for buildings are turned out. Stone for the La Rose Hotel in Santa Rosa came from this quarry. The rock is a dark gray andesite. A 25 h.p. gasoline engine is used and fourteen men are employed. The crushing plant has a daily capacity of 40 cubic yards. The crushed rock is sold at $1.60 per cubic yard in Santa Rosa and $1.10 at the plant. Gravel from Santa Rosa Creek on the same property is also sold by Maroni.

Photo No. 163. Carnegie Library, Petaluma, Sonoma County. Stone from Stony Point Quarry.

Bibl.: R. XII, p. 396; XIII, p. 634; Bull. 38, pp. 163, 345.

Union Construction Company (see *Petaluma Rock*).

Vallejo Estate Quarries. Mrs. L. V. Emparon, Sonoma, owner; H. C. Manuel, lessee. There are several quarry openings on this property ½ mile north of Sonoma. The series of rocks here shows all gradation stages from a fine-grained black basalt through andesite and vitrophyre to tuff. Paving blocks are made from the basalt by Manuel, who had (October, 1913) seven men at work (previously 15 to 20); while the other rocks have been used locally for building stone. As has already been noted, the city of Sonoma has a small rock crushing plant here to utilize the spalls from block-making.

Bibl.: R. XI, p. 462; XII, p. 405; Bull. 38, p. 164.

Violetti Quarry (City Improvement Company). Andrew Nelson, Sonoma avenue, Santa Rosa, owner. This paving block quarry near Melitta has been idle several years.

Bibl.: R. XII, p. 397; XIII, p. 635; Bull. 38, p. 343.

Weyl Quarry. Weyl Estate, owner. This is a small paving block quarry adjoining the Schocken property. Idle the past ten years.

Bibl.: R. XII, p. 397; XIII, p. 635; Bull. 38, p. 345.

Wilkinson Quarry (see McNeill).

Wymore Quarry (see Melitta).

SULPHUR.

Native sulphur occurs at The Geysers and near-by, but no commercial production has been made.

TRAVERTINE AND ONYX.

(See *Healdsburg Marble Company,* under *Magnesite*).

YOLO COUNTY.

Field Work in September, 1913.

Yolo County is one of the central California counties, with Colusa on its north, Sutter and Sacramento on the east, Solano on the south, Lake and Napa on the west. Its area is 1017 square miles. The Sacramento River is its eastern boundary line, and Putah Creek forms most of the southern line. Cache Creek enters the county at the northwestern corner, flowing across to the center of the eastern side where it joins the Sacramento River. Being one of the Sacramento Valley counties, Yolo's resources are principally agricultural. Like Colusa, Glenn and Solano, its mineral resources are largely confined to its western, hilly section. As will be noted from the Table of Mineral Production (see page 196), but two substances up to the present time have been subject to commercial development: quicksilver and sandstone. Their total value to date has been a little in excess of $600,000.

In addition to these minerals there are in the museum of the State Mining Bureau, from Yolo County, specimens of asbestos from the California quicksilver mine west of Rumsey; basalt from near Winters; iron from near Capay. There are also mineral springs, whose locations are noted under that head.

Yolo is one of only two counties of California's fifty-eight which reported no mineral production in 1912 and 1913.

Bibl.: R. X., pp. 773-794; Bull. 38, pp. 264, 360, 365.

BRICK.

To supply a local demand, bricks were for several years made in this county, utilizing clay from beds near Woodland, Winters and Capay, but not for over ten years past.

Bibl.: R. X., p. 791; Bull. 38, p. 259.

COAL.

Some small veins of coal have been found in the western part of T. 9 N., R. 2 W., and also farther north, but no commercial production has ever resulted.

Bibl.: R. X., p. 790.

GOLD.

At one time placer mining in a small way was carried on along both Cache and Putah creeks. Some low grade quartz is also reported to have been found, but no development of any consequence made.

Bibl.: R. X., p. 790.

YOLO COUNTY—Table of Mineral Production.

Year	Quicksilver		Sandstone		Miscellaneous and unapportioned
	Flasks	Value	Cubic feet	Value	
1873	*995	$79,928			
1874	3,000	315,540			
1875					
1876	965	42,460			
1877	1,516	56,547			
1878	1,640	53,956			
1879	1,110	33,134			
1880	422	13,082			
1881					
1882					
1883					
1884					
1885					
1886					
1887					
1888					
1889					
1890					
1891					
1892					
1893					
1894			2,500	$1,000	
1895			542	1,873	
1896			252	378	
1897					
1898			264	384	
1899			264	384	
1900			908	1,760	
1901			1,540	2,300	
1902			328	450	
1903			280	144	
1904			180	720	
1905			175	200	
1906			160	204	
1907			250	350	
1908			140	1,150	
1909					
1910					
1911					
1912					
1913					
Totals	9,648	$594,647	7,783	$11,297	

*Flasks of 76½ pounds.

Totals.

Quicksilver	$594,647
Sandstone	11,297
Total to end of 1913	$605,944

LIMESTONE.

A deposit of limestone is reported in Secs. 30 and 31, T. 10 N., R. 2 W., 3 miles south of Cadenassa Station, on land owned by E. M. Nash, of Saratoga.

MANGANESE.

Manganese is reported on the Nash ranch, 3 miles south of Cadenassa Station. E. M. Nash, Saratoga, owner.

MINERAL WATER.

There are a number of mineral springs in the hills of the western part of the county, but none of them have so far been utilized except locally. Among them the following may be noted:

A *saline* spring on the line between Secs. 25 and 26, T. 12 N., R. 5 W., near Reed mine, now owned by F. A. Kauffman, of San Francisco, as a cattle range.

On the *Smith Ranch*, 4 miles west of Guinda, is an excellent sulphur-iron-magnesia spring which is used privately; also two white sulphur springs not utilized. Dr. R. E. Smith, Sacramento, owner.

A soda spring on the *Scribner Ranch* near the Reed mine west of Rumsey.

A sulphur spring above Fiske Creek, on the Rumsey-Reed mine road.

Several sulphur springs on Putah Creek near Devil's Gate, west of Winters.

Bibl.: R. X., p. 793.

QUICKSILVER.

California Mine (see *Reed*).

Harrison Mine (see *Ruby*).

New England Mine (see *Ruby*).

Reed Mine (formerly the California). F. A. Kauffman, 110 Market street, San Francisco, owner. This mine at the junction of Secs. 23, 24, 25 and 26, T. 12 N., R. 5 W., was in its early history known as the California. It is first mentioned as operating in 1870, and appears in the producing list in 1873, with an output of 995 flasks of quicksilver. The J. B. Randol table (Report of State Mineralogist, Vol. IV, p. 336) credits the mine with a production of 5,653 flasks between 1876 and 1880. It has not been operated since that time, and the buildings have been destroyed by fire.* The ore carried is principally metacinnabarite. The property is now owned as part of a cattle range.

Bibl.: R. IV, pp. 261, 289, 336 (table); V, p. 95; VI, pt. I, pp. 122, 336; X, pp. 358, 793; XI, p. 68; XIII, p. 604; Bull. 27, p. 117; GEOL. SURV. OF CAL., Geol. Vol. II, p. 133; MIN. RES. W. OF ROCKY MTS., 1873, p. 10; 1874, p. 30; 1875, pp. 14, 174, 493.

Ruby Mine (also known as *Harrison* and *New England*). Mrs. Madge Harrison, Georgetown, owner. In Secs. 26 and 35, T. 12 N., R. 5 W., south of west from Rumsey. Idle for years.

Bibl.: R. XII, p. 363; XIII, p. 598; Bull. 27, p. 117; U. S. G. S. Mon. XIII, p. 283

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*Since the above was written, a small output of quicksilver has been reported for the year 1914.

STONE INDUSTRY.

Sandstone beds occur along the ridge near the western boundary of the county, but they have so far been developed commercially at only one point—at Devil's Gate on Putah Creek, west of Winters. Gravel for road work is obtained from the creek beds throughout the county, the owners of the land being paid a per load rate for the privilege. The Southern Pacific Railroad Company formerly took considerable gravel for ballast from Cache Creek near Capay.

Putah Creek Quarry. E. F. Searles, San Francisco, owner, in Sec. 29, T. 8 N., R. 2 W., 9 miles west of Winters. The Michael Building (1895) Woodland, and several in Winters, are constructed of stone from this quarry, but it has now been idle for some years. The rock is a blue-gray sandstone similar in appearance to the well-known Colusa sandstone found to the north of here, but a shade lighter in color.

Bibl.: R. X., pp. 791, 793; XIII, p. 638; Bull. 38, p. 146.

Sackett Quarry. Sackett Bros. owners. On the Sackett ranch, 5 miles west of Winters, there is a body of light-colored volcanic tuff which has been utilized locally for building purposes, but not recently.

Bibl.: R. X., p. 791; XIII, p. 640; Bull. 38, p. 164.

PART III.

The Counties of

Del Norte, Humboldt
Mendocino

By F. L. LOWELL, Field Assistant.

INTRODUCTION.

The three counties presented herewith constitute the northernmost coast group, being at the northwest corner of the State and bordering on the Pacific Ocean. Until quite recently—in fact, subsequent to writing the body of this report—the only transportation connection Del Norte and Humboldt counties had with the rest of the world was by water, Eureka, Fort Bragg and Crescent City being the principal ports. The Northwestern Pacific Railroad has now been completed through to Eureka, giving all but the extreme northern section a direct rail route to San Francisco. A railroad connection to Crescent City is at present under construction from Grant's Pass, Oregon.

The principal industries of this district are lumbering, dairying and agriculture, the mineral output, except for Humboldt, being as yet small. The undeveloped mineral resources, however, are great, the exploitation of which is dependent mainly on improved transportation facilities.

Acknowledgment is here made of assistance rendered by the various owners of properties, both during the field work and in the subsequent preparation of this report.

DEL NORTE COUNTY.

Field Work in August, 1913.

BRIEF GEOLOGIC DESCRIPTION OF DEL NORTE, HUMBOLDT AND MENDOCINO COUNTIES.

In discussing the geology of this section of the Coast Ranges, one is confronted with the similarity of the character of the rocks of the different geological ages and the scarcity of fossils by which the different series of stratified rocks may be distinguished. The rocks of the different formations have undergone such metamorphism that it is at times difficult to detect the change from one series to another. The Coast Range has been subject to so much disturbance that the rock masses have been crushed and faulted out of their original stratigraphic positions.

Beginning at the northern boundary of Sonoma County and extending north through Mendocino, Humboldt, and Del Norte counties, the geological structure is very regular. The rocks are mostly of Cretaceous age and are often very much altered. Serpentine, jaspers and mica slates are encountered in large quantities and in a very irregular manner. There are but few areas of unaltered strata.

The general strike of the axis of the Coast Ranges through these three counties is northwest and southeast and the preponderance of dip is toward the southwest, the crest of the range being nearer the eastern slope. The deep valleys have been eroded by the abundance of water and the level valleys of some of the watersheds contain strata of Pliocene age. These strata are shallow, and fossils have been noted in Del Norte and southern Humboldt counties. The Tertiary rocks are not as prevalent as those of the Cretaceous. The latter are to be noted more particularly in the oil field region of southwestern Humboldt County.

The South Fork of the Trinity River takes the same general northwest direction as the other rivers of the Coast Range. Trinity River changes its direction, flowing nearly west from Weaverville in Trinity County to where it joins the South Fork, thence northwest through the mountains to the coast. The Trinity Mountain range seems to be the joining strip uniting the main Sierras and the Coast Range. The rocks in this northern section become more crystalline, and the older granites which form the nucleus of the Sierras make their appearance. This granite outcrops north of Humboldt Bay and thence north to the state line.

From the junction of the Klamath and Trinity rivers, extending northward to the northern end of Del Norte County, the country is very rugged and covered with forests. The rocks resemble those of the Sierras and are auriferous and cupriferous. The gravels of the rivers also carry gold and platinum values. In this northern region, serpentine is the principal rock. Peridotite, the parent rock of serpentine, is found exposed by erosion on Horse Mountain in northeastern Humboldt County.

It might be said that the greater part of the geological formations of Mendocino, Humboldt and Del Norte counties is composed of sedimentary rocks of Tertiary and Cretaceous age. There does not appear to be a nucleus of igneous rock forming the axis of the range, although granite does outcrop in some parts of this section. There are remains of volcanic activity in the form of volcanic glass and tuff, and solfataric action is still taking place at some of the springs of southern Mendocino County.

Throughout Mendocino and southern Humboldt counties the Cretaceous sandstones are abundant, being very noticeable at Point Arena and in the oil section of southwestern Humboldt. Organic remains are absent except in a very few instances. The rocks of this age have been altered to a considerable extent and serpentines and mica slates are the alteration products.

In Del Norte County, granite forms the nucleus of the mountain ranges and over it is a mantle of metamorphic rocks. In the western portion of the country sedimentary rocks prevail. Intrusive serpentine carries the copper and chrome iron deposits. Quartz occurs in small seams and veins. Copper occurs in lenses of a rich concentration, either as free metal or in sulphides. The slates carry many thin seams of quartz, sometimes rich in gold, and no doubt the erosion of these formations is responsible for the gold concentrated in the streams.

This serpentine belt continues through Humboldt and Mendocino counties. Perhaps the most noticeable occurrence is at Horse Mountain, in Humboldt County. There the copper deposits in serpentine are encountered again. The country has been eroded so extensively that the older crystalline diorites protude through the more recent rock formations. Other acid rocks, such as quartzite, outcrop in large masses. besides a dike of porphyry which forms a well defined contact with serpentine. Not far from Horse Mountain on Willow Creek a large body of limestone is exposed, having a northwest strike. It resembles that in western Trinity County. Another limestone formation north of Humboldt Bay is well exposed. The granite formation also outcrops here.

Passing south through Humboldt County and across the redwood belt, the later formations of sandstone and shale come in. These carry the oil and gas of this section. The formation is very badly broken up and seepages of oil, and gas emanations are numerous. This formation continues into Mendocino County and is most noticeable on the coast at Point Arena. In the southern portion of Mendocino County, the amount of alteration by the introduction of magnesian combinations is noticeable. This is illustrated by the magnesite deposits and the mineral springs of that section.

Taking the three counties together, one might say that the geology is complex, the solution of which will take considerable time and much patience to decipher.

BLACK SANDS.

Almost all of the gold bearing gravels of the Smith River basin contain black sands which carry some platinum. The beach sands also carry values in gold and platinum. In cleaning up the sluice boxes of the hydraulic mines after the season's washing, these black sands are collected in large quantities and the platinum and gold content are found to vary greatly in their relative proportion to each other. On French Hill the platinum forms 5% of the total values. At Antone Kauss' mine on Craigh's Creek pieces of coarse platinum worth up to $25 have been found. On the Myrtle Creek Mining Company's property the black sands are said to assay as high as $3,562 per ton in gold and platinum.

Serpentine is a prominent rock formation in the Smith River basin, and being an alteration rock derived from peridotite which carries platinum, seems to bear out the theory of platinum deposits in the placer gravels.

Outside of these river gravels and sands the only other black sand deposit being worked in the county is on the beach 2 miles south of Crescent City.

Oro Del Norte Company. This company is incorporated for one million shares at a par value of $1 per share. The company owns 255 acres

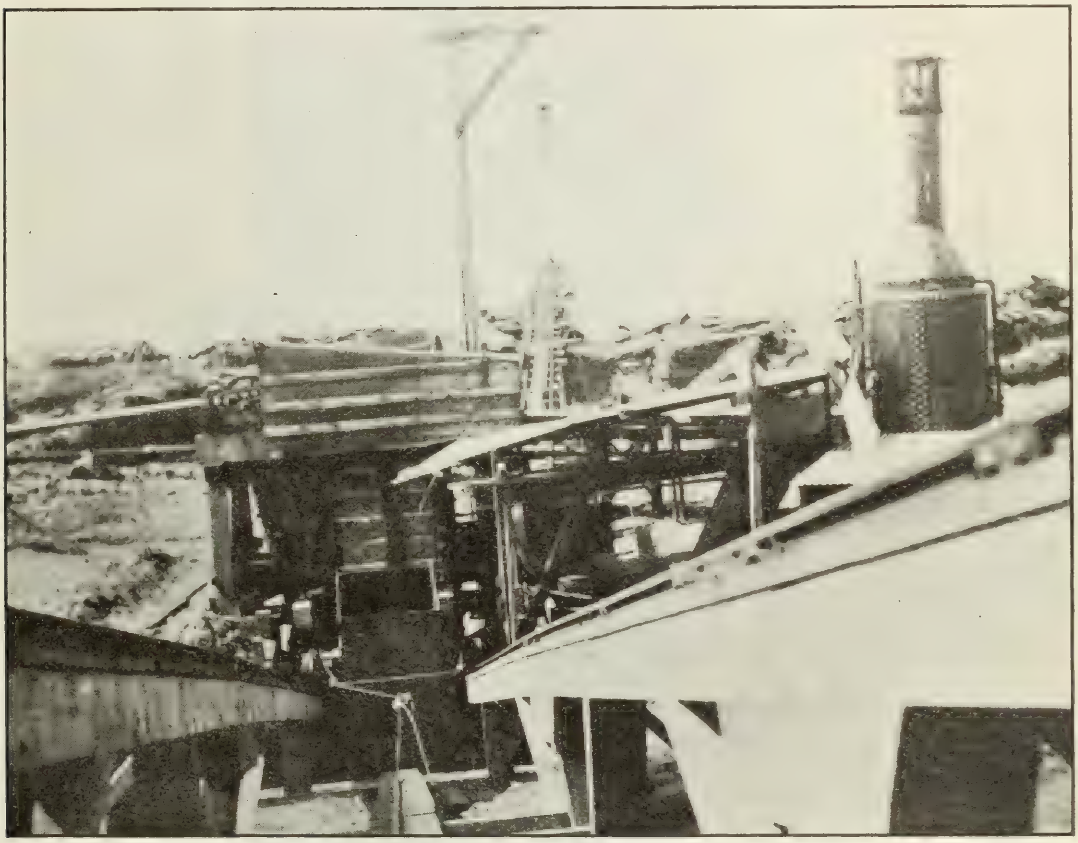
Oro Del Norte Black Sands Plant, showing method of hauling sands to bins on incline trestle.

Oro Del Norte Black Sands Plant, showing suction pipe line.

Oro Del Norte Black Sands Plant, showing the revolving screen.

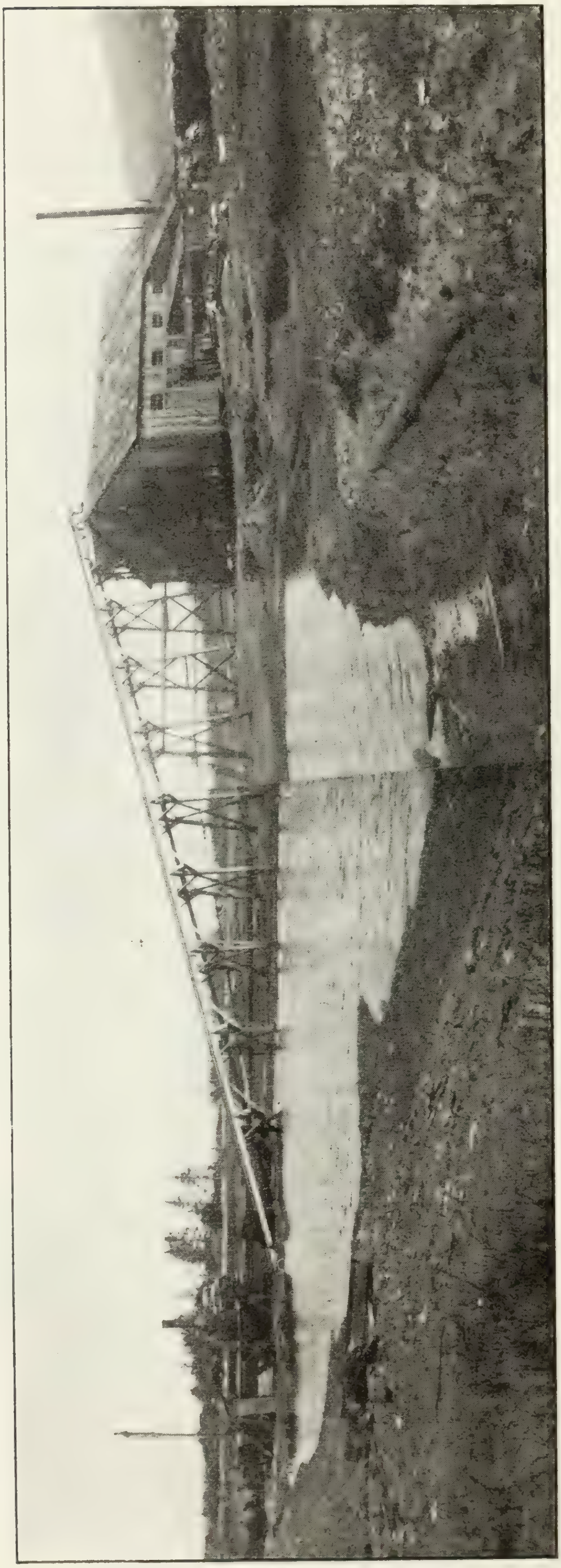
of patented ranch land along the ocean beach 2 miles south of Crescent City. The plant is located just back of the driftwood line and consists of a suction pipe, skip conveyer to the plant, a large area of aluminum plates having riffles cut in them, a second area of small aluminum plates similar to the first, a third metal plate, the composition of which is not known, and an electrical equipment for charging the plates and other uses about the plant.

The company uses the Heintz electric flotation process for treating the sands for their gold and platinum content. The plant requires twenty-five men when in operation. Three shifts are worked and the electric power is developed by a 200 horsepower distillate engine. A change from the wood burning system to distillate was being made at the time I was at the plant. A larger suction pipe line was also being installed. The management claims that the new equipment will handle 800 yards of sand every twenty-four hours.



Oro Del Norte Black Sands Plant, showing sand skip and track for dumping waste.

The suction pipe is 5 inches in diameter and works on the ejector principle. The sand is delivered from the pipe line to a revolving screen which screens out all driftwood and large wash which is trammed to the water's edge and dumped. The sand from the screen falls to a bin from which it is drawn off to a 2-cubic yard skip and hauled up the incline to the sand bins at the top of the treatment plant. Water is



Oro Del Norte Black Sands Plant at Crescent City, Del Norte County, California.

mixed with the sand in sufficient quantity to give it flowing properties. Four thousand gallons of water per minute is sufficient for all purposes about the plant, including the suction pipe line. The sand and water is allowed to flow over the metal riffle area at the same time an alternating current of electricity is passed through the metal plates. These plates have a grade of 2 inches to the foot and the magnetic iron which composes 30 to 50 per cent of the black sands is charged with electricity and repelled, leaving the gold and platinum in a concentrated condition. These plates are hosed off every half hour, the concentrates being washed into a sump from which they are pumped to a second set of aluminum plates of lesser area. These plates are charged with alternating current also but they are made more sensitive. The same process of elimination goes on here as before and these plates are washed off every hour and the concentrates, still further concentrated, go to a sump and are pumped over another metal plate, the composition of which could not be learned.

Oro Del Norte Black Sands Plant, showing the driftwood line.

This plate is supposed to remove the gold and platinum from the remaining heavy minerals. The precious metals are refined and returned as pure gold, platinum, iridium, osmium, etc.

This plant has cost $125,000, with the new equipment. Theodore R. Heintz, president and general manager; H. G. Stevenson, vice-president; and F. S. Markey, secretary. The main office is in the Merchants' Exchange Building, San Francisco.

BUILDING MATERIALS.

The local demand for building stone and brick is so small in the county that this industry has not been developed to any appreciable degree. A sandstone suitable for building purposes, and a clay suitable for making brick, are found 2 miles east of Crescent City. There is a good clay in Elk Valley, and Benjamin Howland is manufacturing brick. He supplies the local demand at $14 per thousand. There is also a deposit of good pottery clay in Elk Valley, owned by George Turner, but it is not developed.

COAL.

Small seams of lignite are found in some parts of the county, but the one locality which has received most attention is on the beach, about 3 miles north of Crescent City. There is an outcrop of what appears to be a tree partly converted to lignite. This tree can be plainly seen at low water. No vein has been found. A shaft was sunk to a vertical depth of 138 feet at a distance of 200 feet inland from the beach line, but no coal or lignite was encountered. It is reported that borings a thousand feet from the shore penetrated a vein that was 3 feet thick. Very little information was available about this discovery, and no development has been done.

CHROME IRON.

Chrome iron is fairly well represented in Del Norte County. There are several croppings in the Rattlesnake Mountains extending from the Bald Hills to the Klamath River. The deposits are in serpentine and are not being developed at this time. The two principal chrome iron deposits worked so far in the county are owned by the Tyson Mining Company, of Baltimore, Md.

French Hill Mines. These mines consist of two patented claims situated on French Hill, in Secs. 5 and 6, T. 16 N., R. 2 E., H. M., at an elevation of 1750 feet. The chromite is in the form of kidneys in serpentine. The deposit strikes northwest-southeast, and dips 60° NE. It is 8 feet thick at the point where the development has been done. One hundred fifty tons of ore are on the dump, and about 200 tons were shipped to Swansea some years ago and proclaimed excellent.

There is a wagon road 3 miles in length from the county road to the property. The mine is owned by the Tyson Mining Company, of Baltimore, Md. It has not been worked for some years.

Low Divide Mines. These mines, consisting of three patented claims, are situated on Copper Creek, 1 mile from the old town of Alta, in Secs. 33, 34, and 35, T. 18 N., R. 1 E., and about 8 miles east of Smith River Corners, at an altitude of 1450 feet. The chromite is in serpentine. An open cut exposes the vein, which is 14 feet wide. There are about 500 tons of ore on the dump. This property is also owned by the Tyson Mining Company, of Baltimore, Md., but is not working now.

COPPER.

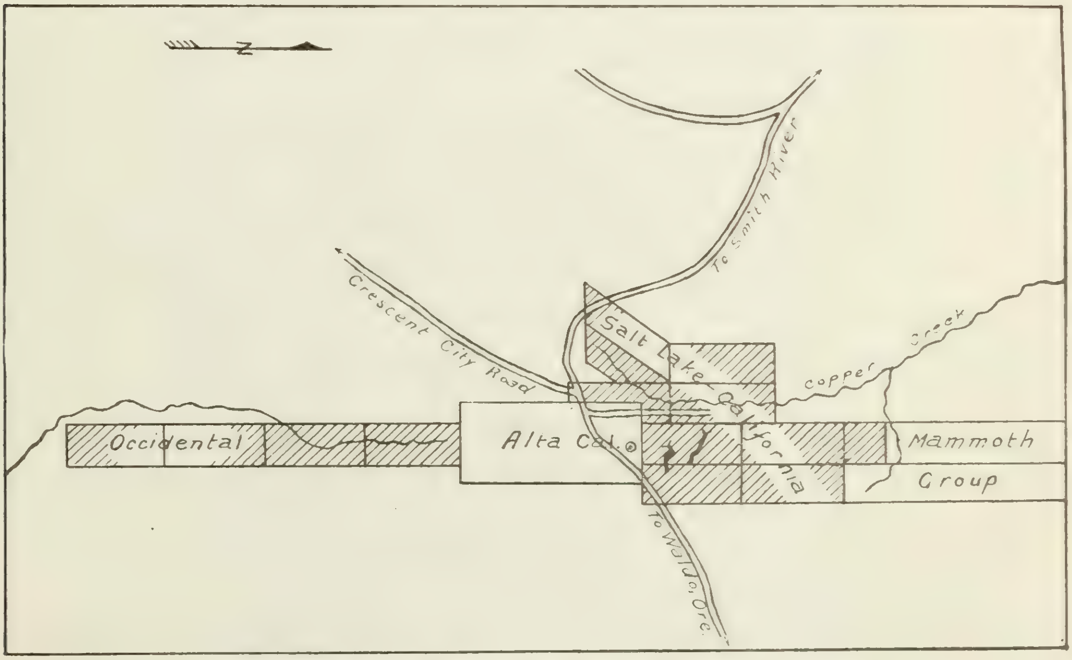
Del Norte County has several croppings of copper ore in its northern half, which extend easterly into Siskiyou County. The copper belt also extends southward along the eastern side of the county and on into Humboldt County.

As far as development in the past is concerned, the most prominent districts are Low Divide in the Smith River basin, and the Dr. Rock district in the southeastern portion of the county. Many scattering prospects are also noted in other parts of the copper belt, such as that on Diamond Creek, a tributary of Smith River; Monumental District, and also at French Hill.

The principal formation is serpentine, and the copper values are generally found in it or closely associated with it. Intrusive dikes of diorite and peridotite are common. The copper lenses appear to be more stable where the acid rocks break through and also show a tendency to persist in depth. The copper ore that has so far been worked, appears to be in lenses of varying sizes and rich in copper glance, cuprite, melaconite, malachite, and native copper. The primary ore, chalcopyrite, is not so much in evidence in the county. Between the years 1860 and 1870, copper ore was shipped from Del Norte to Swansea and also to Germany. The excessive cost of transportation and lack of roads throughout the county compelled the copper mines to close down until some future time when a smelter will be within reach, or railroads are built into the country.

LOW DIVIDE MINING DISTRICT.

This district is in the Smith River basin and is the oldest copper camp in the county. It is situated at the head of Copper Creek, a tributary of Rowdy Creek, at an altitude of 1780 feet. Between the years 1860 and 1870 there was a prosperous mining town here with several hundred inhabitants. There are only two buildings standing at

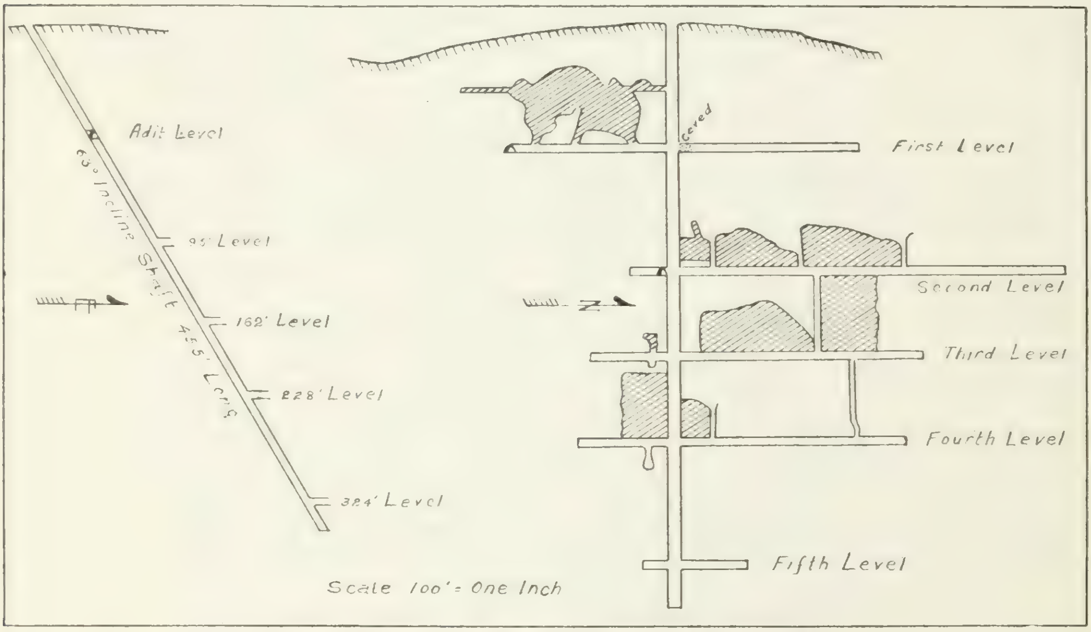


Low Divide Mining District, Del Norte County, California.

the present time, which are occupied by a caretaker of some of the properties. There is a wagon road from Smith River Corners, a distance of 9 miles, to the properties.

The formation is serpentine of a coarse texture and the strike of the vein on which most of the mines are located is north and south, having an easterly dip of from 35° to 65°. The vein swells and pinches along its length, forming lenses. The ores consist of chalcocite, bornite, chalcopyrite and some pyrrhotite.

Alta California Mine. This mine is owned by the Alta California Mining Company, with offices at 519 California street, San Francisco The mine consists of two patented claims and these, taken with the Occidental group of four claims which immediately join the Alta on the south, were bonded to the Salt Lake-California Copper Company, formerly known as the Union Copper Company.



Alta California Mine, Low Divide, Del Norte County, Cal.

Between the years 1860 and 1870 the mine was operated through an incline shaft 455 feet deep and inclined 63° E. This shaft was served by a steam hoist and an air compressor, but no equipment remains. Eight hundred ninety-five feet of drifting has been done on the four levels. The ore was shipped to Swansea and to Germany. These mines have been closed down for many years. The mouth of the shaft has caved. From old records it is shown that ores carrying values of 15% to 18% copper were taken out. Ore averaging 11% was being taken out when the mine closed down. Records of the shipments sent to Swansea show returns of $41 to $102 per ton.

Salt Lake-California Mine. This property was formerly known as the Union copper mine, and is owned by the Salt Lake-California Copper Company, of Salt Lake City, Utah. It joins the Alta on the north and consists of ten claims. Three of these claims, the Union Nos. 1, 2 and 3, are on the extension of the Alta vein. Not far from the Alta north end line there is a strong outcrop of gossan carrying sulphides. This gossan extends the entire length of the two claims and fraction of 3600 feet. This has been exposed in several cuts, and oxides assaying 25% copper were found. There is a 60-foot tunnel and another tunnel 300 feet, both driven across the formation in an easterly direction. From the latter tunnel a drift 100 feet in length was run south and a raise made. A third tunnel further north is 450 feet in length and cuts the vein at that distance. There is a 100-foot drift south from this tunnel on the vein. A 60-foot winze was sunk from this drift. From the bottom of the winze a drift runs south 200 feet; and 17% copper ore was reported. This was the last work done before the mine closed down. A north drift runs from this same winze and is 240 feet in length. The 450-foot tunnel has been extended 200 feet to cut the east vein, but did not reach it. On Union No. 3 a vertical shaft 110 feet was sunk on the vein but no drifting was done.

There is an adit level on the Big Bonanza claim, running east on an east and west vein. This vein is 3 feet wide. This level was extended as far as 350 feet, with hopes of cutting the main north and south vein, but it was not found. Sixty feet below this adit level on the same claim, a 500-foot crosscut tunnel was run to intersect the north and south vein, but failed to locate it. Most of the old workings are badly caved. The shaft has caved near the surface. Four hundred tons of ore from the above 60-foot winze were said to have averaged 18% in copper and $1.50 in gold per ton.

Superior Copper Mine. This mine was formerly known as the Atlantic Pacific copper mine, and covers the Mammoth group of fourteen claims which join the Union mine on the north. The character of the vein is the same as that of the Salt Lake-California mine.

There are three tunnels on this property: No. 1, a crosscut, cutting the west vein; No. 2 is 150 feet below No. 1, and is also a crosscut, 700 feet long. At a distance of 150 feet from the portal, a 4-foot vein of low-grade ore was cut which averaged about $20 per ton in copper, gold and silver. This tunnel failed to cut the main vein. A distance of 250 feet above No. 1 tunnel, a third tunnel was run a distance of 500 feet, and cut a vein which was 2 feet wide. The vein pinched out, however, after some ore was shipped from it. The mine has been shut down for some years.

Frank Zaar Copper Mine. This consists of four claims held by location, the names being "Standard," formerly called Old Hanscom; "Nome," formerly the Copper Queen; "Discovery," formerly Lady Bell; and "A Beauty," formerly Copper Hill. The gossan is prominent on these claims, 4 feet wide with serpentine walls. There is a crosscut tunnel on the Standard 500 feet long, which cuts a 4-foot vein carrying values in copper, gold and silver. From this tunnel there is a drift running southwest 50 feet and a drift northwest 50 feet long, also a winze 60 feet deep. Six hundred feet below No. 1 tunnel, a second crosscut tunnel was run 500 feet to cut the vein deeper but failed to do so. On the ''Nome'' there is a 28-foot vertical shaft on the vein and an open cut on an iron dike which is 18 feet wide. On ''Discovery'' a 50-foot vertical shaft was sunk. This is now caved. A crosscut tunnel 400-feet long failed to cut the vein. On ''A Beauty'' there is a 40-foot vertical shaft sunk on a 6-foot vein which assays 10% copper. Assessment work only is being done on these claims.

Idora Mine. This is only a prospect consisting of three claims situated 9 miles northwest from Low Divide, owned by William Ehrman, Yarbrough and Bricklin. Development consists of one crosscut tunnel 45 feet long, but has not reached the vein yet. There is a 30-foot incline shaft on the vein which is dipping 45° and is 3 feet wide. Five hundred feet along the vein has been stripped on the surface. Only assessment work has been done.

Oriental Copper Claim. There is only one claim held by location, and owned by E. R. Jenkins, of Crescent City. It is situated in the Low Divide mining district, at an elevation of 1900 feet. It has a 15-foot vertical shaft on a 4-foot vein. Only assessment work is being done.

DIAMOND CREEK DISTRICT.

Cleopatra Copper Claims. These claims are owned by James D. Lacey. There were formerly twenty-five claims held by location and known as the Dietrick group. Lacey lapsed in assessment work on all of the claims except one, which he retains. The claim is in T. 18 N., R. 2 E., H. M., at an altitude of 2600 feet, and is close to the California-Oregon line.

The claim was located in 1894, and is a contact vein with serpentine hanging and porphyry footwall. The strike is north and south and the dip 45° E. A 100-foot crosscut tunnel with a 40-foot north drift and a south drift of 80 feet. No. 2 crosscut tunnel is 180 feet long, and No. 3 crosscut tunnel is 130 feet long but did not cut the vein. About 200 tons of ore are on the dump but none has been shipped. Work ceased in 1911.

MONUMENTAL DISTRICT.

Hunters Luck Claims. There are six claims in this group, held by location since 1907. They are situated in T. 18 N., R. 3 E., at an altitude of 3100 feet, and owned by J. W. Ehrman and J. N. Britten. The vein is on the contact between serpentine hanging and porphyry footwall. There are two adit levels, the upper of which is 120 feet long.

The vein as exposed in this level is 8 feet thick. The lower level is 160 feet long and the vein as exposed is 1 foot wide. The strike of the vein is north and south and the dip 50° E. Ehrman lives on the property and is doing some development work. The ores are malachite, bornite and chalcopyrite.

Britton No. 1 and No. 2. There are six claims in this group, held by location since 1904, situated on Patrick Creek at an elevation of 1950 feet. The vein is quartz carrying copper and gold, and the walls are andesite. There are three crosscuts. The third is 340 feet long. There are 120 feet of drifts and a 60-foot winze. The strike of the vein is southwest and northeast and dips 45° SE. Only assessment work is being done.

Klondike Group. This group consists of Klondike Nos. 1 and 2, and seven others located on Patrick Creek, 1 mile south of Monumental. They were located by Luff & Duley, of Crescent City. The vein is quartz carrying marcasite and chalcopyrite, and is 4 feet wide. There are three tunnels. Only assessment work is being done.

Lucky Boy and Rosebud. Property is composed of two claims held by location, the Lucky Boy since 1901, and the Rosebud since 1902. They are situated in T. 18 N., R. 3 E., about ½ mile west of the county road, and are owned by Otto Anderson. The vein is quartz carrying marcasite and chalcopyrite. There are three veins on the Lucky Boy, all of which have cut the main vein, which is 4 feet wide in the upper workings. The strike of the vein is southwest and northeast, and its dip is southeast. There are two crosscut tunnels on the Rosebud, each 80 feet long. One cuts the vein 17 feet from the portal, and the vein was 17 feet wide. The vein is quartz carrying heavy iron sulphides, not much copper, and very little gold. Only assessment work is being done.

Old Crow. Consists of four claims, namely, the Bowman, Morgan Nos. 1 and 2, and the Jumper, all held by location since 1910, and situated in the Monumental district at an altitude of 2800 feet. They are owned by George F. Morgan and Fred Bauman. There is a 2-foot chalcopyrite-bearing quartz vein in porphyry. The strike of the vein is north and south, and the dip 45° E. There are two crosscut tunnels, neither one cutting the vein. Only assessment work is being done.

FRENCH HILL DISTRICT.

There are several copper prospects in this district that should be mentioned, namely—

Hendrix and Howe, consisting of five claims located in 1911, and owned by L. T. Hendrix and George W. Howe.

Hendrix, Howe & McDonald, consisting of five claims located on French Hill, located in 1911, and owned by L. T. Hendrix, George W. Howe and William McDonald.

Frank B. Edwards, prospect situated ½ mile east and 1 mile south of Mary Adams Station, in T. 17 N., R. 2 E. There is a tunnel 30 to 40 feet long. The ore is rich glance and carries values in gold and silver. Owned by Frank B. Edwards of Crescent City.

OTHER DISTRICTS.

Preston Peak Mine. This group consists of two patented claims, namely, the "Hobs" and "Copper Belt," located in 1891; and three unpatented claims, namely, the "Mountain King" and two others, located in 1891. All are situated in T. 17 N., R. 5 E., at an elevation of 4400 feet. They are owned by Charles A. Leib, G. W. Young, H. Mathey and others, of 20 Broad street, Boston, Mass. The mine is in the Siskiyou Forest Reserve, and reached by 5 miles of wagon road and 15 miles of trail from Waldo, Oregon. It became involved in legal difficulties and closed down in 1901.

The country rock is diorite and serpentine, and the vein is quartz carrying chalcopyrite, pyrite, and values in gold. The ore is in the form of a series of lenses, having a strike of about southwest and northeast, and stands almost vertical in the serpentine. The surface croppings have been proven up for a distance of 200 feet. The mine is opened by a crosscut tunnel 315 feet, and at a distance of 235 feet from the portal a 48-foot winze in ore all the way. There was also 37 feet of drifting done around the ore body, and 400 feet of drifting on the tunnel level looking for more ore, but only small kidneys were found. At 650 feet below the upper tunnel a second tunnel was run 55 feet in length, but the work was stopped. No ore was ever shipped. The mine has not been working for some years and the camp buildings have fallen to decay.

Doctor Rock Group. This group of copper claims, six in all, are situated in T. 13 N., R. 3 E., H. M., at the head of Blue Creek, and have been held since 1903. The altitude is 4475 feet. The property is owned by Mrs. F. C. Marlowe, Cordelius Thompson, A. J. Monroe. and F. B. Faucett. The ore is quartz carrying chalcopyrite with slate footwall and serpentine hanging-wall. The strike is north and south and the dip uncertain. The croppings have been proven up for a distance of 800 feet. There is a 10-foot shaft on "Big Strike" claim and a 30-foot crosscut tunnel driven to cut this shaft failed of its purpose. There is a 37-foot adit level on the Doctor Rock claim. The ore carries values in gold and silver besides the copper. No ore was ever shipped and only assessment work is being done.

GOLD—PLACER.

Almost all the gold produced in the county comes from the placer mines of Smith River and its tributaries. The mines are mostly small hydraulic properties where one or two small giants are used during the winter months. In some instances a common fire hose and nozzle is used on the gravel banks and the water, collected from the gulches in the rainy season, is stored in small reservoirs and piped to the gravel.

Aurora Hydraulic Mine. This property consists of two claims of 40 acres, located on French Hill, in T. 16 N., R. 1 E., at an elevation of 1600 feet and held by location since 1907 by Frank Lind, the owner. The gravel consists of high benches and the water supply is dependent on flood waters from the gulches collected in a small reservoir. A 6-inch canvas hose and a 1½-inch nozzle is used to conduct the water and wash the gravel. The gold is coarse. The mine is operated only during the winter months when there is plenty of flood water.

Doctor Young Hydraulic Mine. Consists of four claims adjoining J. M. Darnell's mine in the French Hill mining district in Sec. 32, T. 17 N., R. 2 E., and owned by Dr. W. S. S. Young. There is 1 mile of ditch bringing water under a 50-foot head to one No. 1 giant through a 7-inch pipe. Assessment work only is being done.

Dave Savoy Placer Mine. Consists of two claims in the French Hill mining district. The gravel is ground sluiced, the water being collected in a small reservoir. Owned by Dave Savoy and worked during the winter months.

Elkhorn Hydraulic Mine. The property consists of 2560 acres, mostly bonded, located at the mouth of Patrick Creek, in Sec. 16, T. 17 N., R. 3 E., and controlled by the Smith River Mining Company of Tacoma, Wash. The property is held by location since 1903 and is at an elevation of 1050 feet. There are 3 miles of flume which brings water to three No. 2 giants. There are two camps with accommodations for 25 to 30 men. Three men are now putting the flume in condition to wash this winter.

French Hill Placer Mine. Situated in the French Hill mining district, in Secs. 32 and 33, T. 17 N., R. 2 E., at an elevation of 1800 feet. There are nineteen claims, covering 380 acres, held by location since 1898 and owned by J. M. Darnell. The property is a bench mine and has 5 miles of ditch carrying 500 inches of water from Craigh Creek, and has a 150-foot face. Two No. 2 giants are used, and about 5% of the values are in platinum.

George Washington Placer Claims. These claims are situated on Monkey Creek adjoining the Elkhorn hydraulic mine, and taken together with the Monkey Creek mine, make 480 acres of gravel which have been bonded to the ''Winnie Bob'' Mining Company, capitalized for 1,000,000 shares in the State of Washington. The property is to be equipped with a hydraulic plant soon, but only assessment work is now being done.

George Cook Placer Mine. This mine consists of five claims located 3 miles south of Gasquet on the middle fork of Smith River. It has 4 miles of ditch and one No. 3 giant. The water is brought from Humboldt Flat watershed. During the winter months 300 to 400 miner's inches are obtained. The claims are not patented. Considerable coarse gold and some platinum is obtained.

Kaus Placer Mine. Situated in Craigh Creek mining district in Sec. 1, T. 16 N., R. 1 E., and owned by Antone Kaus. Two claims have been held by location for the last forty years. The gravel benches are ground-sluiced, the water coming through a $\frac{1}{4}$ mile ditch, giving a 30-foot fall. A 6-inch pipe and a 6-inch canvas hose bring the water to the gravel. A 2-inch nozzle is used. The gold and platinum are coarse, and worked during the winter months.

Myrtle Creek Hydraulic Mine. Situated in the Myrtle Creek mining district, in Secs. 3, 4 and 10, T. 16 N., R. 1 E., at an elevation of 260 feet, this mine is owned by the Myrtle Creek Placer Mining Company of Crescent City. The property consists of eighteen claims, or 360 acres. The gravel benches are washed by water taken from a $1\frac{1}{2}$-mile ditch, with a head of 75 feet. Eleven-inch pipe, with one No. 2 and one No. 3 giant, is used. The gold assays $18.50 to $19 per ounce. The black sands carry platinum in considerable quantity.

Monkey Creek Placer Mine. Situated in the Monkey Creek mining district and held by location since 1893, are seven claims owned by J. A. Haight and D. Haight. The gravel benches are ground-sluiced, the water coming through $1\frac{1}{2}$ miles of ditch from Monkey Creek. The dam has collapsed and no work outside of assessment work is now being done.

Nels Christensen Hydraulic Mine. This property is situated 300 yards from the forks of Smith River and consists of 34 acres of bench gravel, held by location since 1885 and owned by Nels Christensen of South Fork. There is a $1\frac{1}{2}$-mile ditch carrying 500 inches of water with a 75-foot fall through 9 and 12-inch pipe to a No. 2 giant.

Oak Flat and East Fork Groups. This property consists of 270 acres located in the Patrick Creek mining district at an elevation of 1430 feet, and is owned by a party of eight people (S. F. Raymond, D. E. Raymond, A. E. Newman, A. E. Newman, Jr., C. Newman, J. W. Ehrman, and Homer White). The mine consists of 270 acres of bench and creek gravels. Water is brought from Shelly and Patrick creeks through 3 miles of flume and ditch with a head of 650 feet. One No. 2 giant is used. The ditch is built for $1\frac{1}{4}$ miles and the remainder is now under construction.

Walter Crook Hydraulic Mine. This property adjoins Dave Savoy on French Hill in the French Hill mining district. It consists of three claims owned by Walter Crook and held by location. There is 1 mile of ditch taking water from Allen Gulch, a tributary of Craigh Creek, through a 7-inch pipe to a No. 1 giant. Worked during the winter months only.

GOLD—QUARTZ.

The output of gold from Del Norte County is due entirely to the placer mines, the production from the quartz mines being nil. Most of the ores from the quartz veins of the county are base and require concentration and shipment. The transportation facilities are so poor that development of quartz properties is hindered. Only assessment work is being done on such prospects at present.

Black Diamond Gold Quartz Mine. This mine is at an altitude of 6500 feet, and is nearly on the eastern boundary of the county, about 8 miles from the Doctor Rock mine. It consists of four claims located in T. 14 N., R. 4 E., H. M., and held by location by L. T. Hendrix. The vein, which is quartz, has a north and south strike and dips 70° E. Trap rock forms the hanging-wall, while the footwall is composed of shale. The ore is base and carries gold and silver values. The vein has been trenched, but no work further than assessment has been done.

Hard Luck Mine. This mine consists of six claims situated on Monkey Creek in the Monumental mining district and held by location since 1904 by J. N. Britton, of Waldo, Oregon. The vein is quartz carrying gold and arsenical sulphides. The development consists of two crosscut tunnels and 400 feet of drifts. Five tons of ore were shipped to the Selby smelter and are said to have assayed $10.40 per ton in gold. Only assessment work is being done.

Monumental Consolidated Quartz Mine. This property consists of eight claims of 165.28 acres, located in T. 18 N., R. 3 E., in the Monumental mining district, held by location since 1901 by the J. O. B. Gunn estate and Davis. The mine is at an elevation of 2560 feet. The vein is quartz, carrying specular iron with gold values and some copper. There is a 3-compartment vertical shaft 212 feet deep and an incline shaft to the 100-foot level from the other shaft. There is $\frac{3}{4}$ of a mile of drifts, an upraise from the 100-foot level to the surface and a winze from the 100-foot level. There are six prospect tunnels from 30 to 40 feet long. The ore is crushed in a Huntington mill and concentrated on a Frue vanner and Pender table, and the concentrates were formerly shipped to Selby. Power for the mill is furnished by water under 150-foot head through a 6-inch pipe acting on two Pelton wheels. The winding engine was run by steam and a Cameron shaft pump used to unwater the shaft. The camp consists of a store, bunkhouse, cookhouse, office, laboratory and barn, which are now in charge of a caretaker.

The mine has been closed down for several years and the camp is a convenient stopping place for travelers over the main highway from Oregon to Crescent City.

Ora Anna Quartz Mine. This property consists of one patented and three unpatented claims, owned by the Ora Anna Quartz Mining Company of Crescent City. It is situated in T. 16 N., R. 1 E., in the Bald Hills mining district, at an elevation of 1400 feet. There are two parallel veins between slate hanging-wall and hard porphyry footwall, and the vein filling is quartz carrying gold, both free and in the sulphides. The average width of the vein is 6 feet, and the strike is east and west, with a dip of 45° to the north. There is a tunnel 300 feet long from which a winze 70 feet deep has been sunk. There is an upper tunnel 40 feet in length. The equipment amounts to very little and one cabin remains on the property. Since 1897 only assessment work has been done.

Monumental Mine buildings at Monumental, Del Norte County, California.

QUICKSILVER.

Quicksilver in small quantities has been found in the northern part of the county in T. 18 N., R. 2 E., H. M., and also on Diamond Creek, a tributary of Smith River. Poor transportation facilities prevent development.

HUMBOLDT COUNTY.

Field Work in September, 1913.

BLACK SANDS.

In former years the black sands of the beach and bluffs of northern Humboldt County were successfully worked at Upper and Lower Gold Bluffs, Big Lagoon, and Little River. The gold was fine and was saved by the use of the Oregon tom and ordinary tom and amalgamating plates. After a severe storm on the coast, the fine gold could plainly be seen concentrated on the beach in places. After the tide had receded, pack mules were taken down and the sand packed away in sacks for washing. Many thousands of dollars were taken out in this manner but for some reason the gold does not concentrate in paying quantities now and this method of collecting the sands has been abandoned. At Upper Gold Bluffs, a tunnel through the range of hills dividing Prairie Creek and the coast was cut one-half mile in length to bring water from Prairie Creek for washing the sands and gravels. The locators of these beach claims became involved in litigation with locators of the land as timber claims and mining has been abandoned and the plant is in ruins. The sands and gravels of Klamath River carry a good percentage of black sands having a gold and platinum content and some of the hydraulic mines are losing considerable of their values, which are carried away in the heavy gray and black sands which quickly clog the undercurrent riffles and cause an overflow of concentrates and values. They are desirous of finding a cheap method by which these sands can be worked continuously in connection with the ordinary hydraulic operations, thereby not only saving the values but also saving much lost time used up in clearing the riffles of the troublesome sands. Outside of the black sands encountered in the hydraulic diggings, there are no other sands that are being worked in the county at the present time. The gold and platinum are too fine and not in sufficient quantity to pay for working with the appliances available at present.

BUILDING MATERIALS.

Brick and Tile. There are only two companies in Humboldt County who manufacture brick or tile and they are able to supply the local and county demand. The Fortuna brickyard at Fortuna formerly owned by J. A. Thompson has been closed down and Mr. Thompson is now interested in the Eureka Brick and Tile Company of Eureka.

Eureka Brick and Tile Company. John A. Thompson and John Porter own four acres of clay land in the suburbs of the city of Eureka. The plant consists of one stiff mud brick and tile machine, one mixing machine, one grinding machine, one cut-off machine, one 70 horsepower engine, one boiler, one 300-barrel and one 100-barrel oil tank, water tank, scrapers and clay cars. Oil is used as fuel and the plant has a capacity of 25,000 brick per day. They make tile 3 to 12 inches in size and sell their brick at $10 per thousand at the plant. Tiling is sold at 2 cents per foot for 3-inch size up to 15 cents per foot for 12-inch size. This tile is used principally in land drainage.

Humboldt Clay Manufacturing Company. Lewis H. Hess, president, and W. Ernest Dickson, secretary, of Eureka. They own 1¾ acres of clay land adjoining the Eureka Brick and Tile Company in the suburbs of Eureka. The plant consists of one American Clay Machinery Company clay machine, one mixing machine, one disintegrator, one re-press, one cutoff machine, one 100 horsepower engine, two boilers, one oil tank (500 barrels). They sell the brick at $10 per 1000 at the yard and have a capacity of 25,000 brick per day.

There is an excellent blue clay on Jacoby Creek owned by J. A. Moore which is well adapted for the manufacture of brick. Nothing is being done with the clay at the present time.

QUARRIES.

The only quarries in the county are those being operated for the purpose of obtaining rock to be used in building the jetty at the mouth of Humboldt harbor and for road metal.

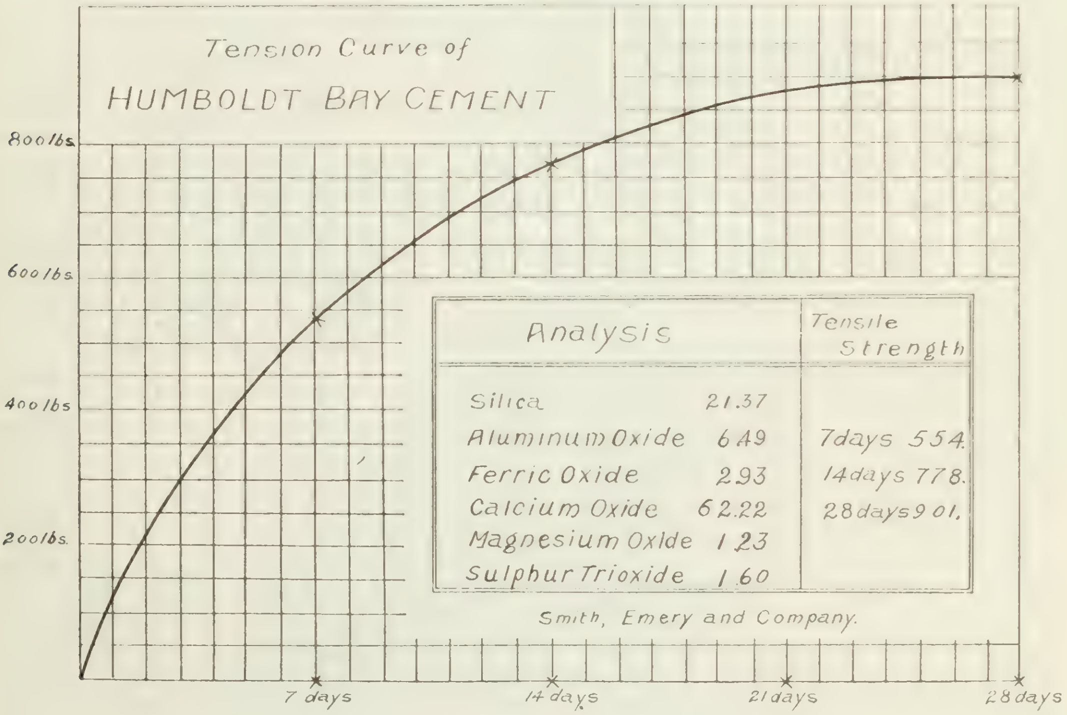
Haw Quarry. This quarry is owned by G. A. Dungan and I. M. Long, and is situated in Sec. 21, T. 5 N., R. 1 E., Humboldt meridian, and 6 miles from Eureka, at an elevation of 150 feet. There are 700 acres. The rock is a basaltic lava termed tachylite (Lawson). The plant consists of one mile of standard gauge railroad which connects with Humboldt Bay. There is one locomotive and eleven bottom dump cars, one barge, one tow boat, one air compressor, two Sullivan air drills, one No. 3 gyratory crusher, one 12-foot screen, drill tools, etc. The buildings consist of a cookhouse, blacksmith shop, powder house and several smaller buildings. Electricity is purchased at 2 cents per kilowatt hour. The capacity is 400 tons per ten hours. The rock is hauled by rail one mile to the bay and loaded on barges and towed to Eureka. The specific gravity of the rock is 3.169 and contains 42.7 per cent silica. The rock is used for road metal and for filling.

Jacoby Creek Quarry. This quarry is leased by the Pacific Engineering and Construction Company of San Francisco, S. L. G. Knox, president. The quarry is 5 miles from Arcata and the equipment consists of 5 derricks, 90 cars, 3 barges and 1 tug, one 4-drill compressor, 4 compressed air drills, 1 drill sharpener, 2 hoisting cranes and the necessary drill steel. This company has the contract for furnishing the fill for the harbor jetty now being built. The rock is a meta-morphic sandstone and one quarry is a mica schist. This company is supplying the rock for the construction of the jetty at the entrance of Humboldt harbor.

Isaac Minor Quarry. This quarry consists of granite suitable for building purposes and is situated on Warren Creek which is a tributary of Mad River in T. 6 N., R. 1 E. Although the rock is suitable for building purposes, yet granite used in the county for such purposes as monuments is imported from other parts of California. There is so little construction going on in the county that requires a good building stone that the quarries, or rather the prospective quarries, have not been developed. The only rock being used at present is that used for road metal and for the federal work on the harbor jetty.

CEMENT.

A cement manufactured from a limestone cropping on Jacoby Creek in Secs. 13 and 14, T. 5 N., R. 1 E., on the property of the Bayside Lumber Company has been tested and an analysis made by Smith-Emery & Company of San Francisco, and the following facts as shown by this tension curve, obtained:



Analysis		Tensile Strength
Silica	21.37	
Aluminum Oxide	6.49	7 days 554
Ferric Oxide	2.93	14 days 778
Calcium Oxide	62.22	28 days 901
Magnesium Oxide	1.23	
Sulphur Trioxide	1.60	

Smith, Emery and Company.

LIMESTONE.

There is considerable limestone in the county suitable for burning for lime and also for fertilizer and smelter flux. The most accessible deposits to Humboldt Bay are on Jacoby Creek in Secs. 13 and 14, T. 5 N., R. 1 E., on the property of the Bayside Lumber Company. It is 3 miles from the bay and on the railroad. There is also another deposit on Jacoby Creek owned by J. A. Moore of Blue Lakes, Humboldt County. The analysis by the Miller & Brown Company of San Francisco gives the following results:

Analysis of Limestone from Jacoby Creek.

Received from State Mining Bureau, 1 piece of rock for analysis.
Sample found to contain the following:

Silica, SiO_2	1.41%
Lime, CaO 53.61%, $CaO.CO_2$	95.74
Iron oxide—Fe_2O_3	.35
Alumina—Al_2O_3	.56
Magnesia—MgO	Trace
Water	.01
Residue from carbonaceous matter	.50
	98.57

Volatile, CO_2, H_2O, etc. = 42.40 per cent.

There is a large dike of limestone crossing in a northwesterly direction from Trinity County to Humboldt County in T. 4 N., R. 5 E., which extends northwesterly and passes to the east of Horse Mountain and cuts across Willow Creek. This limestone formation has not been developed and is a source of immense quantities of good limestone.

There is also considerable limestone in the southeastern section of the county which has not been developed.

COPPER.

The copper belt of Humboldt County, as far as development to date has proved, extends along the eastern part of the county, east of the redwood belt and extending from the southern end of Del Norte County south for the entire length of Humboldt County and over into the

Copper Croppings on the property of the Horse Mountain Copper Mine, Humboldt County, California.

parts of western Trinity County difficult of access. The copper of Humboldt County, like that of Del Norte County, is associated with serpentine. There are dikes of quartzite and diorite protruding through the serpentine in many instances and also the mother rock of serpentine, called peridotite, is encountered in a more or less altered condition.

The principal district where copper mining is being done at the present time is Horse Mountain, situated in T. 5 and 6 N., R. 4 E. The ore on the mountain seems to be of a secondary nature, consisting of bunches of impregnated serpentine close to the surface, in which the values run high in copper glance, bornite, native copper, and malachite. The general strike of the formation is northwest and southeast, with a dip to the northeast. The formation is mostly serpentine, porphyry and gabbro, the latter having peridotite closely associated with it, from the decomposition of which the serpentine is formed. Chrome iron is also encountered in small quantities in the serpentine.

Camp buildings of the Horse Mountain Copper Mining Company, on Horse Mountain, Humboldt County, California.

There are quartz and diorite dikes protruding through these formations all seeming to have a northwest and southeasterly direction and a northeast dip.

Next to Horse Mountain, the district where copper development has been done to a considerable extent is Red Cap Creek. Several Copper companies, namely the "Red Cap," "La Perin" have held claims on the ridge between Boise and Red Cap creeks and have done considerable work. Much rich copper ore has been found in the slides from the hills but the ore has never been found in place. No development is being done at the present time and the old tunnels have caved in and the buildings gone to ruin.

Nothing in the way of development is being done on Lassen Creek in T. 1 S., R. 4 E., or on the Rainbow or Crimson groups, in T. 1 S., R. 1 E., in the Mattole mining district.

Horse Mountain District.

Horse Mountain Copper Mine. This property consists of ten groups of claims, making 70 claims in all. They are unpatented and are situated on Horse Mountain in Secs. 33 and 34, T. 6 N., R. 4 E., and Secs. 3 and 4, T. 5 N., R. 4 E., at an altitude of 5000 feet. The property is owned by the Horse Mountain Copper Company, which is a

Mill of the Horse Mountain Copper Mine, Humboldt County, California.

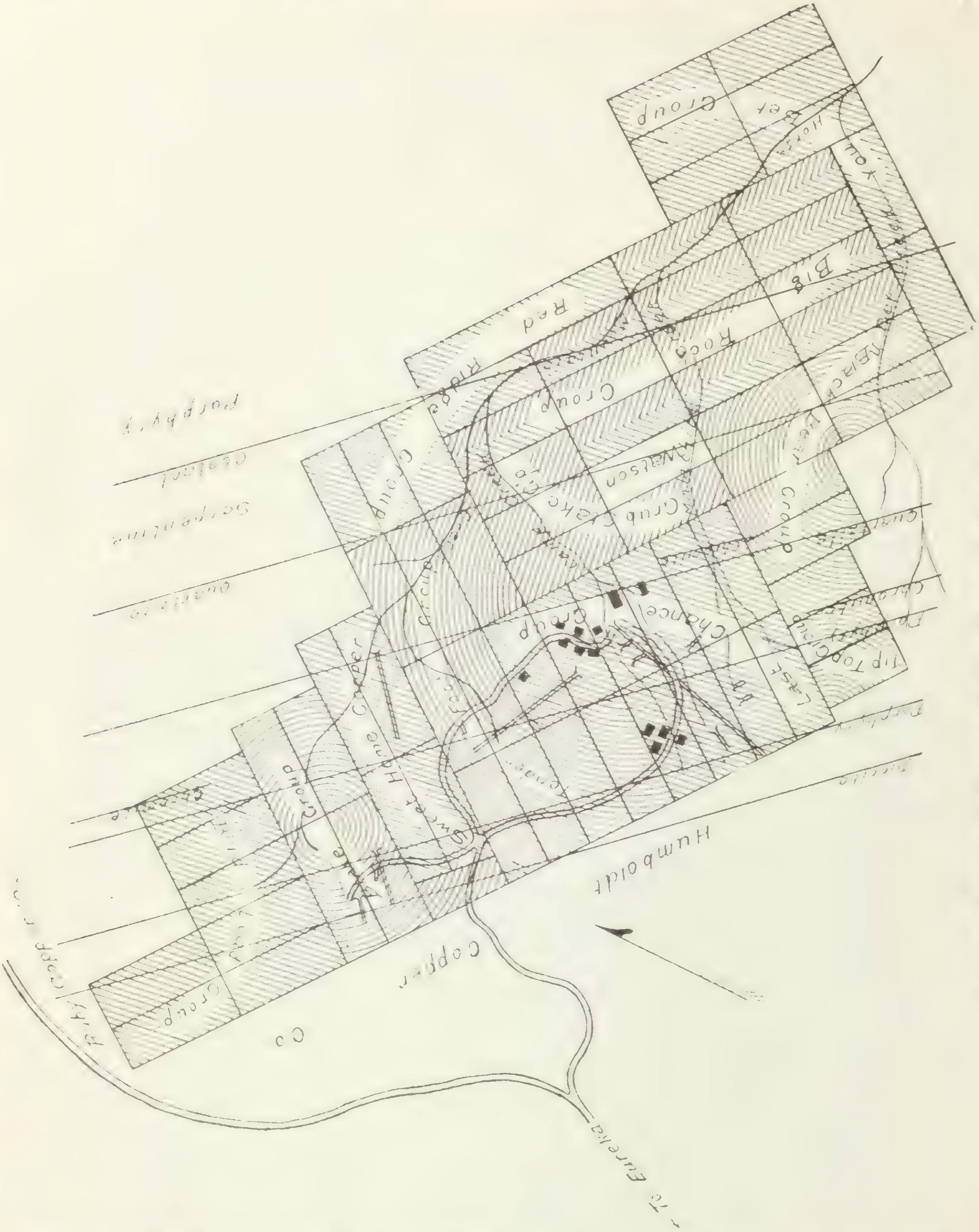
stock company. The railroad from Eureka runs to within 25 miles of the mine and this distance is covered by a good wagon road. The original claims were located by Dave Wilson in 1907. The strike of the formation is northwest and southeast and dips about 40° NE. There are six crosscut tunnels and one adit level, also some open cuts. There is 3000 feet of underground development, mostly drifts and crosscuts. Steam supplies the power for the sawmill and two Huntington mills (one being 3½ and the other 5 feet). It also furnishes power for a Blake ore crusher, two Dodge secondary crushers, one Standard and one United concentrating table and two classifiers. Twenty-six men are employed underground and on the surface. Some concentrates have been shipped to Humboldt Bay but have not reached the smelter.

The middlings are stored for future treatment. The concentrates average 20% copper and the middlings about $\frac{2}{5}$% copper. The values in gold are about $4 per ton for the concentrates. A 16 h.p. Corliss distillate engine furnishes power for ventilating. Two 50 h.p. boilers, one 14 h.p. engine, one 20 h.p. engine and one 40 h.p. engine complete the power equipment.

The surface equipment consists of one sawmill with a capacity of 7000 feet, one blacksmith shop, one timber framing shop, barn, cookhouse, office, assay office, powder magazines and several bunk houses, making 35 buildings in all. Scraps from sawmill used for fuel.

Humboldt Copper Mine. This mine consists of eight claims or 160 acres, unpatented ground, which adjoins the Horse Mountain Copper mine on the southwest and lies in Secs. 28 and 29, T. 6 N., R. 4 E, and Secs. 32 and 33, T. 6 N., R. 4 E., at an altitude of 4800 feet. A wagon road is 25 miles from Korvel to the mine. The mine is owned by the Humboldt Copper Mining Company of Eureka, T. L. Loofbourrow, president, and Kenneth Newett, Jr., secretary. The original claims were located in 1905. The country rock is mostly serpentine with dikes of porphyritic diorite and granodiorite. The ores consist of chalcopyrite, chalcocite, cuprite, and free copper. The strike is northwest and southeast and the dip 45° to the northeast. The underground workings consist of three crosscut tunnels, 25, 100 and 700 feet, respectively. There are 750 feet of drifts, 20 feet of winze and 210 feet of raise. Assessment work only is being done and no ore has been shipped. The surface buildings consist of a cook house, bunk house and blacksmith shop.

Sweet Home Copper Mine. This property consists of eight claims of 160 acres of unpatented land adjoining the Horse Mountain mine and lies in Sec. 28, T. 6 N., R. 4 E., at an altitude of 4800 feet. The property is owned by the Sweet Home Mining Company of Eureka, E. P. Shier, president. A wagon road crosses the property and is within 1000 feet of the main workings. The ores are the same as those



Horse Mountain Copper Mining District, Humboldt County, California.

of the Horse Mountain mine. The strike is east and west and the dip 45° N. There are four crosscut tunnels and 230 feet of drifts. The company is doing assessment work only and some ore has been shipped for a test. The ores are chalcocite, bornite, cuprite and native copper. The surface equipment consists of a bunk house, cook house and a blacksmith shop.

Ruby Copper Mine. This property consists of thirty-eight claims or 760 acres of unpatented land situated to the northwest of the Horse Mountain Copper mine in Secs. 16, 21 and 28, T. 6 N., R. 4 E., at an altitude of 4500 feet. These claims are owned by the Ruby Copper Mining Company of Eureka, E. A. Walters, president, and Frank W.

Belcher, secretary. There is a wagon road to the mine. The original claims were located in 1907 and consist of the Blind Lead Group and the Ruby Group. Serpentine with dikes of porphyritic diorite and quartzite makes up the formation and the ores are the same as those of the Horse Mountain mine. The strike is northwest and southeast with a vertical dip. The underground workings consist of a crosscut tunnel 510 feet long and 250 feet of drifting. A small 60-foot shaft from the surface is also sunk.

The surface buildings consist of a cook house, bunk house, blacksmith shop, and a timber shed. The mine is in a developing stage and the ores consist of chalcopyrite, cuprite, chalcocite, and bornite. There are also some black oxide ores and some gold values are obtained.

Mattole Mining District.

Rainbow Group. This copper prospect, consisting of nineteen claims, is located sixty miles south of Eureka in Secs. 19, 30 and 32, T. 1 S., R. 1 E., and also in Secs. 12 and 19, T. 1 S., R. 1 W. Several trenches have been cut across the vein matter and some carbonate ore has been opened up for several hundred feet along the strike of the croppings. No work has been done on this group of claims for some time.

Crimson Group. This group of copper claims, consisting of 80 acres of patented land, joins the Rainbow group of mines on the south, and is in Sec. 8, T. 2 S., R. 1 E. Several prospect holes have been sunk over the 80 acres and carbonate ore has been found. No work has been done on the property for some years.

COAL.

There are indications of lignite seams in several parts of the county, including the following places:

Maple Creek.
East branch of north fork of Eel River.
Near Mrs. Ray's house at Garberville.
Mad River.
Van Dusen River, two miles east of Hydesville.
Crogan Gulch, Maple Creek.
Buck Mountain Creek, near Garberville.

Coal is also found at the following places in the county:

On the east branch of the north fork of Eel River.
Ten miles from Garberville.
Jacoby Creek.
Two miles north of Arcata.
On the upper Mattole River.
On Larribee Creek.

Some of this coal has been burned in a blacksmith forge and found to be satisfactory. The seams, however, are not wide and this taken together with the cost of transportation and the cheapness of oil fuel, prohibits the development of these coal and lignite seams.

GOLD.

The gold production of Humboldt County is not large, being only $31,271 for the year 1912 (California State Mining Bureau Bulletin 65). This gold comes from the placer mines in the northeastern part of the county, on the Klamath River from the Hoopa Indian Reservation to the eastern county line and from the south end of the reservation southward along the Trinity River to the east line of the county. There are also two quartz mines that are being developed, but without any production as yet. One is on Red Cap Creek, which is a tributary of Klamath River, and the other is at the headwaters of Willow Creek, which is a tributary of Trinity River.

Red Cap Mine (quartz). Consists of ten quartz and three placer claims, all unpatented and owned by a stock company called the Red Cap Mining Company of Eureka, Humboldt County. The claims are located in Sec. 33, T. 10 N., R. 6 E., on the north fork of Red Cap Creek at an elevation of 2640 feet above sea level. These claims have been held since 1899. The country rock is porphyry with diorite dikes intersecting the formation. There are four veins being worked at the present time. The ore in the upper levels is free milling and in the lower levels it is a heavy sulphide carrying some copper. The strike is northeast and southwest and dips 70° to the northwest. There are three tunnels and 280 feet of drifts; also a 4-foot crosscut tunnel which is the lowest working tunnel and is only 45 feet in length. There are 100 feet of raises and 30 feet of winze. The mine equipment consists of the usual strap iron tunnel track, one ore car, blacksmith shop, hand steel, etc. The reduction equipment consists of a Gardner crusher, one Frue vanner concentrator, and amalgamating plates. There is also a wire aerial tramway from the upper tunnels to the ore bin at the crusher. The mine is only developing and no ore is being shipped.

Bonneyville Quartz Mine. Consists of six claims and a fraction of 130 acres of unpatented land owned by the Bonneyville Mining Company of Eureka, F. E. Peaslack, secretary, and Charles Helwig, president. The claims are located in Sec. 15, T. 6 N., R. 4 E., at the head of Willow Creek, which is a tributary of Trinity River, and at an elevation of 1640 feet. The claims have been held since 1912. The country rock is slate and porphyry. The veins are all in slate with the exception of one which is a contact vein, the contact being slate and porphyry. The strike of the formation is northwest and southeast and dips northeast about 30°. There are four adit levels with 15, 15, 20 and

375 feet of drifting done on them respectively. There are two cross-cuts, one 15 feet and one 35 feet, 375 feet of track of strap iron, one ore car and the necessary drill steel. There are two cabins on the property and a road was being built from the county road to the property. A water right of 300 inches also belongs to the property.

Little Klondike Mine. Consists of three placer claims and four quartz claims owned by F. Lubbs of Orleans, which adjoin the Red Cap mine at the head of Red Cap Creek. The quartz vein has prophyry walls and is very irregular in width. It frequently carries high values in free gold and in other places traces of copper are found. There is one mile of ditch and a cabin on the place. Only assessment work is being done.

Quartz Prospect on Pearch Creek. This prospect is on Pearch Creek, 2 miles from its mouth and 3 miles from Orleans. It consists of one claim on a vein which is 6 to 14 inches in width in schist formation. It carries free milling quartz which is crushed with an arrastra which is run by water power. The vein is inclined to be pockety and the gold is rather light, going $14 to the ounce. This prospect works in winter only.

GOLD—PLACER.

Placer mining in the county is confined to the Klamath and Trinity rivers, and the season varies from a few days (as in the case of the high gravel banks) to several months during the winter for the lower bars, where water can be ditched to the property.

Allen Mine (hydraulic). Consists of two unpatented claims owned by A. H. Allen of Orleans and located in Sec. 15, T. 10 N., R. 5 E., at the mouth of Red Cap Creek at an elevation of 460 feet. These claims have been held since 1898. They consist of bench gravels on a slate bedrock. There are 3.4 miles of ditch, 1000 feet of 11-inch pipe and one No. 2 giant served by 400 inches of water under a head of 80 feet. The gold is saved by block riffles, undercurrent and quicksilver. The mine works five months during the winter. The gold mints $17 per ounce and has platinum associated with it in small amounts.

Bondo Mine (hydraulic). Consists of two claims of 40 acres, formerly known as Croton Bar Mine and Markeson Mine, and owned by Morris Bondo of San Diego. The property is located in Sec. 29, T. 11 N., R. 6 E., on the Klamath River, 1½ miles up the river from Orleans. They consist of bench gravels, some of the gravel being cemented. The bedrock is rough slate, the strata standing on end. There are one mile of ditch and flume, 1400 feet of 22-inch, 18-inch, 15-inch and 11-inch pipe, two reservoirs and two No. 2 giants. There are 800 feet of sluice and the gold is saved by block riffles and quicksilver.

There are a house, blacksmith shop, barn, powder house and a derrick on the property. The gold mints $17.10 per ounce and the gold is about the size of wheat.

Cavanaugh Mine (hydraulic). Consists of one claim of 20 acres owned by C. A. Sample of 1202 I street, Fresno. It is located in Sec. 1, T. 9 N., R. 4 E., on the Klamath River, about 3 miles above Weitchpec, at an elevation of 550 feet. This claim was located in 1870 and has changed hands several times. The bedrock is an altered schist and the course of the channel is east and west. The property has 900 feet of ditch and brings 300 inches of water from Boulder Creek at a head of 90 feet. One No. 1 giant with 11-inch pipe is used. Block riffles with quicksilver and no undercurrent. The gold assays $18 per ounce. There are two houses, one blacksmith shop and a barn on the property. Work is done only during the winter months.

Clover Flat Placer Mine. Consists of 170 acres of patented mineral land and 173 acres of unpatented land owned by the Clover Flat Gold Mining Company of which F. E. Herrick is president and L. B. Campton is secretary. The mine is located in Secs. 17 and 20, T. 7 N., R. 5 E., on the Trinity River about one mile north of the village of Willow Creek (sometimes called China Flat) at an elevation of 675 feet. The claims were located in 1870 and worked most of the time up to 1912. The bedrock is slate and the course of the channel is north and south. The property has 2½ miles of ditch which brings 2500 inches of water under a 175-foot pressure. The gravel is heavy wash. Block riffles, undercurrent and quicksilver are used for saving the gold. The equipment consists of 1000 feet of 22, 18, 15, 13 and 11-inch pipe, one No. 2 and one No. 3 giant, 400 feet of sluice, one reservoir covering an acre of ground and another reservoir a little less than an acre in area. A derrick is used for moving large boulders. The gold assays $18 per ounce. The gravels contain a large percentage of heavy black and gray sands, which cause considerable trouble in the riffles and undercurrent by clogging up and causing the gold to flow over. There is one third as much platinum as gold content. The mine has shut down until such time as some appliances are found for saving the gold and platinum contained in the heavy sands.

Florence Placer Mine. Consists of one claim of 20 acres of unpatented mineral land owned by J. E. Middlesworth and located in Sec. 31, T. 10 N., R. 5 E., on the Klamath River a little over 3 miles above Weitchpec, at an elevation of 570 feet. This claim was located in 1907 by J. E. Middlesworth, and has been worked ever since during the winter months. There is a good road to a point on the river opposite the mine. The bedrock is an altered schist. The gravel is a medium wash and the course of the channel is northeast and southwest. There are 340 feet of ditch which carries 300 inches of water at a 40-foot pressure. Split riffles are used in saving the gold. A 7-inch pipe and canvas hose are used for conveying the water to a 2½-inch brass nozzle. The gold is scaly. It assays $18 per ounce. There is one cabin on the property and a pipe shed.

Klamath River Hydraulic Mine. Consists of fourteen claims or 280 acres of unpatented mineral land formerly known as the A. D. Miller mine and owned by the Klamath River Mining Company. The mine is located in Sec. 1, T. 9 N., R. 4 E., and Sec. 6, T. 9 N., R. 5 E., in the Weitchpec mining district and about 3 miles north of the village of Weitchpec, on the Klamath River. The elevation is 550 feet. These claims have been held since 1860. Good roads to the mine from the coast, also from Orleans. There are two miles of flume which brings 1500 inches of water under a pressure of 200 feet. The gravel benches have a northeast and southwest direction and the bedrock is an altered schist. The gravel is a medium wash and carries no cement gravel. The claims were located in 1860. An 18-inch pipe serves a No. 4 giant and 16-inch pipe for a No. 3 giant. The present company has been operating for the past three years. The gold assays $18 per ounce.

Orcutt Hydraulic Mine. Consists of one claim called the Indian Jack and owned by Ira Orcutt and located in Sec. 29, T. 11 N., R. 6 E., in the Orleans mining district about 2 miles northeast of the town of Orleans. The claim is unpatented and lies at an altitude of 500 feet. These claims were located in 1891 by Orcutt and have been worked every winter since. The bench gravels have a northeast and southwest direction and the bedrock is slate. There is a ditch 3 miles long that brings 500 inches of water under 150 feet pressure; 500 feet of 11 and 9 inch pipe conducts the water to one No. 2 giant.

Orleans Bar (hydraulic). Consists of 1300 acres of patented mineral land and about 600 acres of unpatented land owned by the California Mining and Dredging Syndicate and located in Sec. 1, T. 10 N., R. 5 E., Secs. 25 and 36, T. 11 N., R. 5 E., Secs. 30 and 31, T. 11 N., R. 6 E., on the Klamath River at the town of Orleans at an altitude of 376 to 3300 feet above sea level. The years of location of the different claims are not given. The gravels are bench gravels, some being high benches and other low benches. There is a good road to the property, completed during the summer of 1912. The claims are on the Klamath Forest Reserve, and the tailings are dumped into the river. There is a report on the property made by H. DeC. Richards, E.M. Water is brought from Camp Creek, Wilder Creek and other creeks and there are 10 miles of flumes and ditches which carry 2000 inches of water that can be delivered under a head of 400 feet. The course of the channel is northeast and southwest and the bedrock is slate and serpentine.

The slate is stratified with quartz seams. The mine is equipped with reservoirs and also has 3000 feet of 18-inch and 11-inch pipe and four giants, namely, one No. 3, two No. 4 and one No. 5. There are two sawmills, four blacksmith shops, store, barn and two dwelling houses. There is also a machine shop with a complete equipment of tools.

Block riffles and undercurrent with quicksilver are used. The mine has not been working for one year. Thomas M. Logan is president; H. DeC. Richards, vice president and general manager; D. F. Hamon, secretary, and Dred T. Hale, superintendent.

Pearch Mine (hydraulic). Consists of two claims, patented, owned by P. L. Young and others of Orleans, and located in Sec. 32, T. 11 N., R. 6 E., about 1 mile northeast of the town of Orleans on the southeast bank of the Klamath River at an elevation of 537 feet. These claims were located about forty years ago by a man by the name of Pearch, and the names of the claims are John A. and Eli Pearch. They are on the Klamath Forest Reserve. There is a good road to the mine from Orleans. The course of the gravel channel is northeast and southwest and the gravel is a heavy wash with a little cement gravel. There are 1½ miles of ditch and flume which brings 1000 inches of water from Pearch Creek under a head of 170 feet. There are two reservoirs, 1000 feet of 22, 18, and 15-inch pipe, one No. 3 and one No. 4 giant. Eight hundred feet of sluice with block riffles and quicksilver are used to save the gold. There are two dwelling houses, a barn, wagon-house and other small buildings on the property. This mine is in operation every winter.

Red Porphyry Mine (hydraulic). Consists of four and one half claims or 90 acres of unpatented mineral land owned by O. T. Crowe, B. F. Hiatt and others, and located in the Willow Creek mining district in Sec. 17, T. 7 N., R. 5 E., about 2 miles north of the village of Willow Creek on the west bank of the Trinity River. Claims located in 1899. A good road from Eureka crosses the mine. The elevation above sea level is 600 feet. The mine is on the Trinity Forest Reserve. There are two gravel channels having a north and south course, one bench being 900 feet long and the other about 1200 feet long. The bedrock is a black slate. Water is brought from Kirkham Creek in one mile of ditch and 500 feet of flume; 500 inches of water, under 250-foot head, is used; 470 feet of 11-inch pipe and one No. 2 giant are used; 240 feet of sluice and 32 feet of undercurrent, block riffles and quicksilver are used. There are two buildings and a blacksmith shop on the property. The mine was not worked very extensively up to 1907, but since then it has been worked every winter. The gold is fine, assays $18 to $18.25 per ounce and has platinum associated with it.

Rocky Point Mine (hydraulic). Consists of three claims of 60 acres located twenty years ago and unpatented. Owned by William Wittmore and located in the Orleans mining district in Sec. 21, T. 11 N., R. 6 E., at an elevation of 500 feet. There is a wagon road to within 2 miles of the property, which lies 3 miles northeast of Orleans on the southeast bank of the Klamath River. They are in the Klamath Forest Reserve. Water is brought from Wittmore Creek by one mile of ditch and 300 inches of water at 150-foot pressure is delivered to one No. 2 giant by 600 feet of 9-inch pipe. The bedrock is slate and serpentine and the bench gravel has a northeast and southwest course. There are 200 feet of sluice, and block riffles and quicksilver are used for catching the gold. There is one house on the property. The mine works during the winter months only.

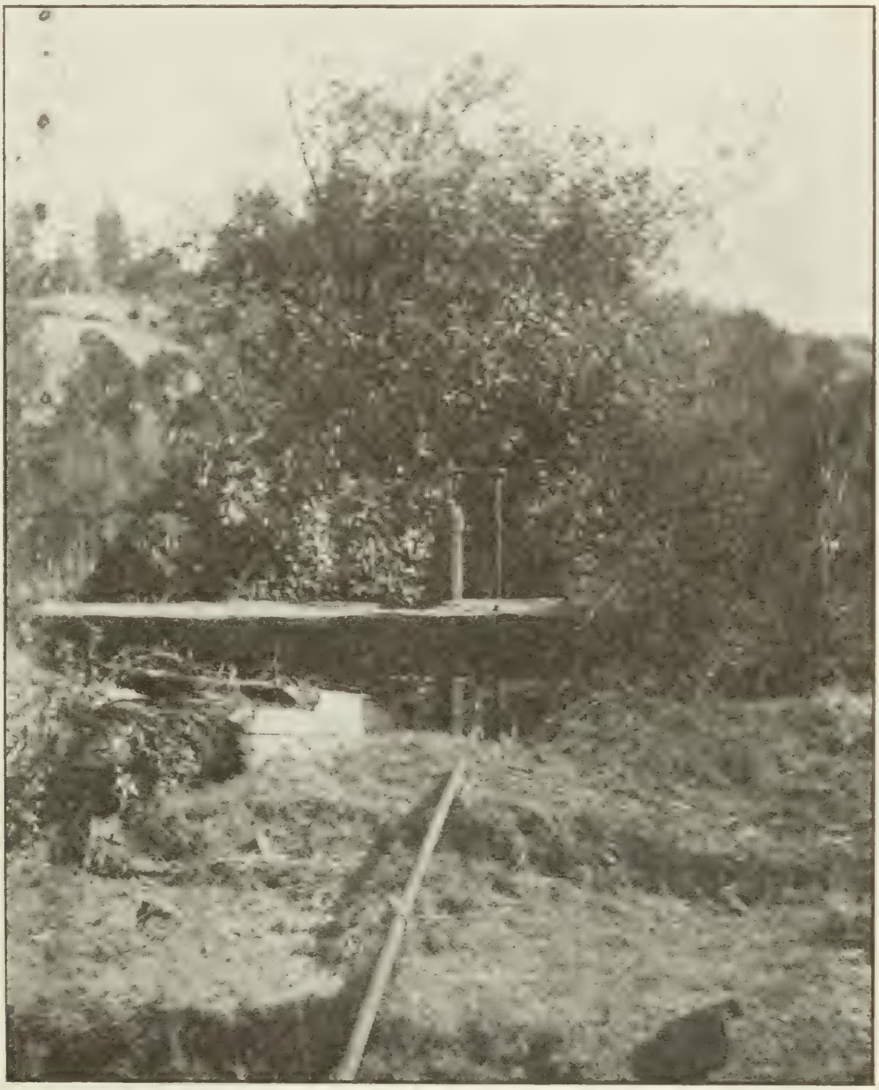
Rosalina Placer Mine (hydraulic). Consists of two unpatented claims owned by Lew Nelson and located in T. 11 N., R. 6 E., on the northwest bank of the Klamath River about eight miles from Orleans by trail at an altitude of 550 feet. These claims were located about twenty years ago and are in the Klamath Forest Reserve. There are two benches of gravel, both having a northeast and southwest course, and the bedrock is slate. There is ¼ of a mile of flume, one large reservoir and 800 inches of water are brought to the mine under a 400-foot pressure through 200 feet of 21-inch pipe and 300 feet of 15 and 11-inch pipe. Two No. 2 giants are used. Block riffles with undercurrent and quicksilver are used for saving the gold. There are one house, a blacksmith shop, derrick and a barn on the property. The gold is fine and flaky and assays $17 per ounce. A little platinum also accompanies the black sands. The mine works only three months in the winter.

Rough and Ready Placer Mine (hydraulic). Consists of 40 acres of unpatented mineral placer land, and 80 acres of patented land, formerly known as the Rough and Ready Placer and the Sarvorum placer groups, the former owned by A. R. Wilder and the latter owned by A. R. Wilder, E. F. Wilder, B. H. Wilder, D. Wilder, and N. Wilder. They are located in Secs. 1, 2, 11 and 12, T. 10 N., R. 5 E., in the Orleans mining district, 3 miles southwest of Orleans on the southeast bank of the Klamath River. The Sarvorum group of 80 acres is patented, while the remaining is unpatented. The Rough and Ready group was located some time in the sixties and the Sarvorum group was located in 1894. This property is at an altitude of 500 feet. The gravel benches have a northeast and southwest course and the bedrock is slate. Water is brought to the property from Boise Creek and tributaries in 4¾ miles of ditch and flume, 100 inches being used under 250-foot head. The gravel is medium wash with large boulders on bedrock. There are 1000 feet of 11, 9, and 7-inch pipe, one No. 1 giant, 200 feet of sluice boxes, one barn, one small sawmill and several smaller buildings. The sawmill is run by water power generated by an undershot wheel. The gold assays $17 to $17.25 per ounce. Small spots of cemented gravel are found on bedrock. There is about 10 per cent loss in fine gold. The Rough and Ready group is about 300 feet above the river and the Sarvorum is about 60 feet above. The Sarvorum is used for ranching purposes now. The Rough and Ready is worked every winter.

Salstrom Placer Mine (hydraulic). Consists of five claims, none of which are patented. They are located in Sec. 1, T. 10 N., R. 5 E., and Sec. 36, T. 11 N., R. 5 E., 1¾ miles southeast of the town of Orleans, on the northwest bank of the Klamath River, at an altitude of 500 feet. They consist of gravel benches. The course of the channel is east and west. The bedrock is slate and the wash is large with large boulders on bedrock. The county road runs through the property. These claims are owned by Jonas Salstrom of Orleans. The property is in the Klamath Forest Reserve. Water is brought from Crawford Creek in ⅝ of a mile of flume; 800 inches under 185-foot pressure is delivered in 1500 feet of 24 and 15-inch pipe to one No. 2 and one No. 3 giant. These claims were located first in 1852 and relocated in 1890. One claim was located in 1910. Fourteen hundred feet of sluice boxes are used and block riffles with quicksilver are used to save the gold. There is a dwelling house, blacksmith shop, tool house, sawmill and barn on the place. The sawmill is run by water power. A small amount of platinum accompanies the gold. At the present time the mine can only work nine weeks during the winter months, on account of the scarcity of water. The gold is flaky and assays $17 per ounce.

Thompson Bar (hydraulic). Consists of four unpatented claims located in the Weitchpec mining district about halfway between Weitchpec and Orleans, on the northwest bank of the Klamath River, in Sec. 20, T. 10 N., R. 5 E., at an altitude of 650 feet. They are owned by William M. Salsbury, who located them in 1907. The county road passes on the opposite side of the river. The mine consists of bench gravels on a slate, serpentine and schist bedrock. The course of the channel is northeast and southwest. The gravel is small wash with large boulders on bedrock. Water is brought from three small creeks south of Red Cap Creek in 2½ miles of ditch and flume under 200 feet head. Three hundred inches are used. Hungarian riffles and quicksilver are used to save the gold. During the last three years no work in the way of washing has been done on account of the ditch being carried away frequently by the side hill sliding out. Eighty-four feet of sluice boxes carry the gravel into the river. The gold is flaky and assays $17 per ounce. No platinum contained in the gravel. There are 300 feet of 11-inch pipe from the ditch to the No. 2 giant.

Weitchpec Bar Mine (hydraulic). Consists of one unpatented claim of 20 acres located in the Weitchpec mining district at the village by that name in Sec. 10, T. 9 N., R. 4 E., at an elevation of 640 feet, and owned by J. C. Gist. The county road runs through the property. The bench gravels have a northwest and southeast direction and the bedrock is an altered schist. The gravel is medium size and loose. Water is taken from Weitchpec and Ben creeks and the Klamath River, 300 inches being brought to the mine in one mile of flume and ditch and under 125 feet pressure. There are 250 feet of 15-inch pipe and 1000 feet of 11-inch pipe, three giants, Nos. 1, 2, 3. One derrick for handling boulders, 250 feet of sluice boxes. Block riffles and quicksilver used to save the gold. There are a house and a barn on the mine. The gold is flaky. The mine works every winter and generally closes down the first of June. There is some platinum in the gravels.



Briceland Estate Gas Well at Briceland, Humboldt County, California.

NATURAL GAS.

As mentioned under oil, a gas suitable for illuminating and fuel purposes flows from some of the wells in the oil district of the county. There are many instances where gas is escaping from oil seepages, but only in two instances is the gas in sufficient quantity to be useful for domestic purposes.

Frank Peters Gas Well. There are three springs on Frank Peters' land in the village of Capetown in Sec. 13, T. 1 N., R. 3 W. The gas is tanked and used in the house for lighting and fuel purposes.

Briceland Estate Gas Well. A gas well is located on this estate at the town of Briceland in Sec. 18, T. 4 S., R. 3 E. The well is 780 feet deep and has 7⅝-inch casing. The well is capped and the gas is drawn off by a 1-inch pipe for lighting the houses of the town of Briceland. No storage tank is used, consequently the pressure is rather low after a few hours' use.

GRAPHITE.

Graphite of an impure quality is found at Otto Rest on the South Fork of Trinity River on the line of the new state highway, also in T. 10 N., R. 4 E., and a little near the city of Eureka. No development has been done.

IRON.

Vivianite (phosphate of iron) is found on Maple Creek and also at Yager. Hematite boulders in large quantities are found on the ocean beach 4 miles south of Centerville. Soft red hematite also occurs on James Creek, 2 miles northeast of Arcata. No development is being carried on with these deposits.

MINERAL WATERS.

At the present writing no mineral water is shipped out of the county, although arrangements are being made to place the output of a new spring on the market in the near future. There are not many mineral springs in Humboldt County. Some years ago a spring was being used by the Humboldt Mineral Water Company. It was located at Flannigan's mill, 2 miles south of Eureka on the edge of the bay, and owned by the Bayside Lumber Company. The waters were bottled for local consumption until another firm began to bottle and charge the city water for local consumption.

The waters from the above mentioned spring contained the following ingredients:

Sodium chloride	32.91
Calcium carbonate	16.37
Magnesium carbonate	10.63
Sodium carbonate	2.45
Silica	1.32
Aluminum	.20
Iron oxide	.06

Traces of sulphates and organic matter and abundant carbonic acid.

Felt's Springs. These springs are situated on the side of the mountain, 1 mile west of Strongs Creek and 5½ miles northeast of Fortuna, in T. 3 N., R. 1. E., H. M. There are three sulphur springs close together, and at one time hotel accommodations could be had at the springs.

Waters contain the following minerals:

Sodium chloride
Sodium carbonate
Potassium chloride
Potassium carbonate
Potassium sulphate
Calcium carbonate
Magnesium chloride
Magnesium carbonate
Manganese
Traces of iron
Alumina
Silica.

Iagua Mineral Water. This spring is situated on the water front of the city of Eureka on the property of the Pacific Oil and Fuel Company. At one time the mineral water bubbled from the mud flats of the bay until a bulkhead was put in and the spring piped up to the level of the wharf. A pump is now used for securing the water and the spring is visited by many of the residents of the city. The Indians are supposed to have used the water years ago and the Indian name of "Iagua," meaning "Good morning," still clings to it. An analysis made by Professor William D. Johnson in 1885, gives the following ingredients:

One U. S. gallon	Contains in grains
Sodium chloride	1,403.00
Sodium carbonate	10.10
Sodium bromide	14.00
Potassium sulphate	12.20
Magnesium chloride	101.00
Magnesium sulphate	211.30
Calcium carbonate	3.80
Calcium sulphate	42.50
Alumina	1.30
Silica	0.95
Ferrous carbonate	0.12
Traces of manganese, boracic acid, iodine and lithium	1,800.27

There is carbonic acid gas in small amounts and the water is saturated with sulphuretted hydrogen. This mineral water is being placed on the market in San Francisco by George A. Knight, who owns the spring.

Cooks Springs. These springs are situated on North Yager Creek, 35 miles east of Eureka. They are sulphur and iron springs but have not been exploited.

Mountain View Spring. This spring is situated on Mad River, 28 miles from Eureka, and is a small spring smelling strongly of sulphuretted hydrogen.

Yager Creek Springs. They are located on the headwaters of Yager Creek on the ridge between it and Mad River. No improvements have been made on the property.

OIL.

Oil was known by the white man to exist in the southwestern portion of Humboldt County as early as 1860 and by the Indians even before this time. Oil was collected from seepages at times and used for supposed medicinal properties that it possessed. After the collapse of the oil boom in the eastern states in 1861 and 1862, people again began to make investments in oil. The people of California hoped to find an oil field in this State similar to that in Pennsylvania. Samples of oil were collected from the different seepages in the county, an oil boom started and many locations made. The town of Petrolia was laid out and times were good for a while. It was very difficult and expensive to transport supplies and machinery to the oil district, as roads were few and the steamers made their landing at Eureka and freight had to be shipped to the oil district by freight teams.

The principal oil field extended from the coast line at Capetown thence in a southeasterly direction to Garberville, on the south fork of Eel River, a distance of about 42 miles in length, and from the Rainbow ridge on the northeast to the Cooskie range on the southwest, a distance of 12 miles. This district may be divided into the Bear River district, which includes Bear River and its tributaries; the second or Lower Mattole River and lower north fork of Mattole River, and the third or the Upper Mattole River and upper north fork of Mattole River. The fourth district embraces the territory in the vicinity of Briceland and Garberville.

In the vicinity of Briceland the general strike of the formation is northwest and southeast. In some places the formational series of metamorphic gray sandstones and shales contain no fossils but are thought to be of Cretaceous age. In other places a series of sandstones and shales containing fossils of Neocene age are noted lying nonconformably on the sandstone and shale of Cretaceous age. The Cretaceous rocks are lying at a fairly steep dip and, in places, carry petroleum and gas. There are numerous seepages of oil throughout the district, and oil can be gathered at these places in small quantities. Gas also is found escaping through the oil and water in these springs.

The oil in the Petrolia district is of a dark green color, while that of the Briceland district is more reddish in color. Both oils are of a paraffine and olefine base with a specific gravity (at 64° F.) of 0.8229, which is equal to 39.8° Baumé. It had a flash test of 73° F. and a fire test of 84° F. and has high burning qualities. The oils contain a high percentage of paraffine wax and produce a fairly good quality of lubricating oil and a high grade cylinder oil.

Distillation percentages obtained from Humboldt County oils: 25.1 per cent engine distillate 50° gravity Baumé at 60° F.; 35.2 per cent water white refined oil with fire test of 123° F.; 7.75 per cent white neutral oil at 35.5° gravity Baumé at 60° F.; 29.90 per cent lubricating oil of 28° gravity Baumé at 60° F.

Union Well. Drilling for oil in Humboldt County began in the year 1865 and, according to men familiar with oil development in the county, the first well was called the Union and was drilled in that year under the auspices of Hon. L. Stanford. This well was drilled in Sec. 30, T. 1 S., R. 1 W. (all wells referred to the Humboldt meridian), and was 500 feet deep. It is reported to have been a 10 to 15-barrel well. The oil had to be pumped. For the log see the seventh report of the State Mineralogist.

Brown and Knowles Well. This well is situated in Sec. 24, T. 1 S., R. 2 W., on the north fork of the Mattole River. It was drilled to a depth of 300 feet, but no oil was obtained. No gas or water flowed from the well.

Henderson Well. This well was situated in Sec. 15, T. 1 S., R. 2 W., and was drilled to a depth of 500 feet. It was reported as a 10-barrel well and had to be pumped.

McNutt Gulch Well. Situated in Sec. 30, T. 1 S., R. 1 W., and was down 300 feet. It was drilled in 1865 and gave only a few barrels.

Burrows Well. This well was situated in Sec. 5, T. 2 S., R. 1 W., and was drilled by the Far West Oil Company in 1892 on Buckeye Creek. At a depth of 500 feet, a flow of 5 barrels was obtained. At 800 feet, the string of tools was lost and the well was abandoned.

Davis Creek Well. This well is situated in Sec. 13, T. 1 S., R. 3 W., and was drilled in the year 1893 by the Far West Oil Company. Drilling was continued to 800 feet, at which depth the casing was pulled and the well abandoned. Whether oil was obtained is not known.

Mackintosh Well. Situated in Sec. 29, T. 1 S., R. 2 E. It was drilled in 1902 to a depth of 1700 feet, and the flow is reported to have been 15 barrels of 45° gravity oil.

Craig Well. This well is situated in Sec. 30, T. 1 S., R. 1 W., and was drilled in 1902 to a depth of 700 feet. Another hole was put down to a depth of 800 feet, but the results were not satisfactory.

Wild Goose Wells. These wells are situated in Sec. 15, T. 1 S., R. 2 W., and were drilled in 1901 and 1902, one to a depth of 700 feet and the other to 1033 feet. No oil was obtained in the 700-foot well, but in the other oil was obtained at a depth of 221 feet. Oil sands 60 feet thick were passed through, and from these the drill passed into black shale. At 300 feet the water was shut off, and at 400 feet a small quantity of oil was obtained. The next 40 feet the formation was limestone, but a thin oil sand was struck at 441 feet. At 555 feet gas was encountered in large quantities sufficient to throw the string of tools from the casing. At 775 feet an oil sand yielded a flow of 15 to 20 barrels. At 1033 the string of tools was lost and the well abandoned. Water is now flowing from the well.

Humboldt Well. This well is situated in Sec. 6, T. 2 S., R. 1 W., and was drilled in 1901 and 1902 to a depth of 2000 feet. The formation was black shale all the way. Only a trace of oil was found at 1200 feet, and the well was abandoned.

Hoaglin Well. This well is situated in Sec. 2, T. 3 S., R. 1 W., and was drilled in 1901 and 1902 by the Mattole Paraffine Company. It was drilled to a depth somewhere between 1700 and 1800 feet. Some oil at 1600 feet was obtained but the quantity could not be ascertained.

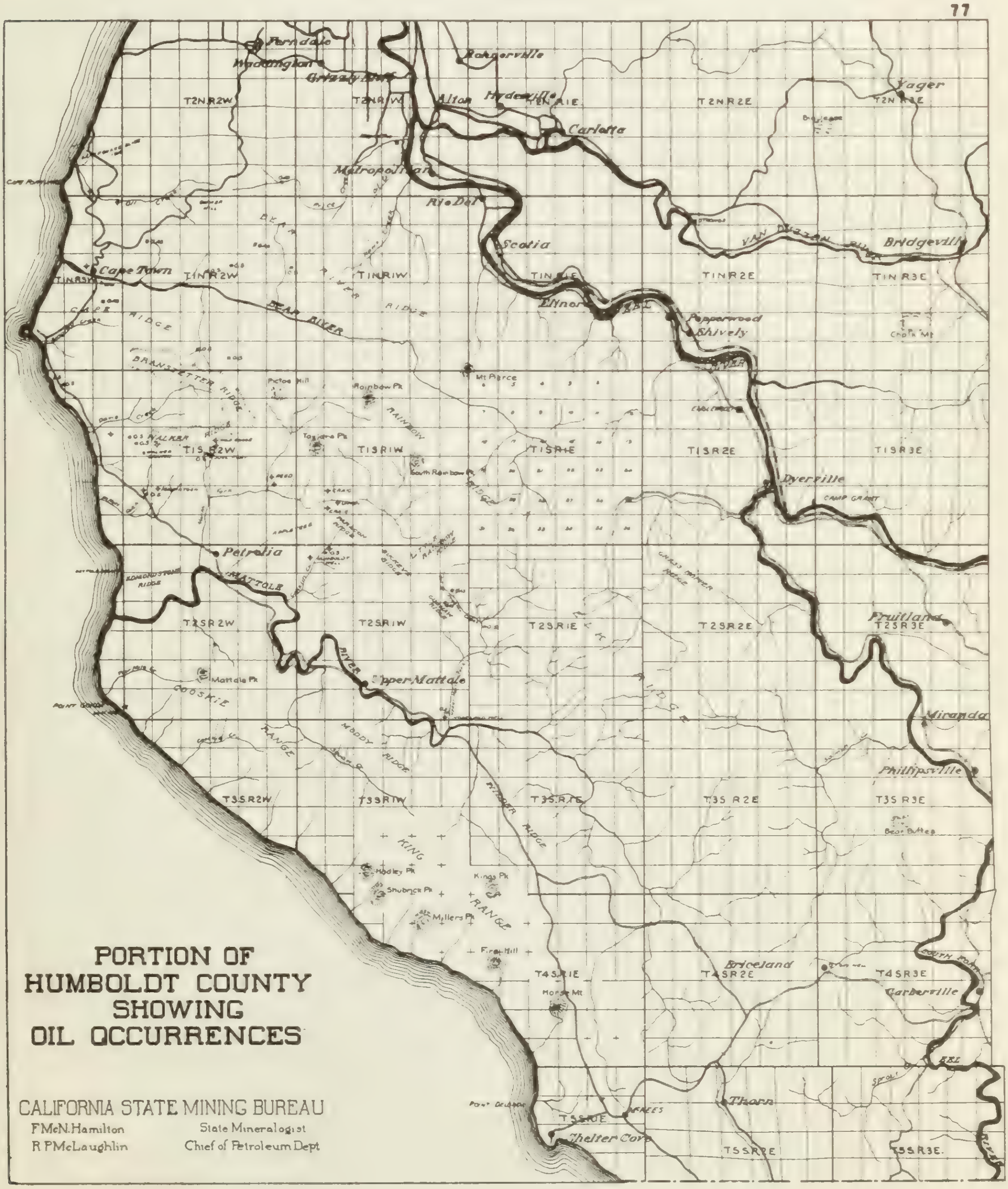
Reed Well. Located in Sec. 14, T. 1 S., R. 2 W., this well was drilled in 1901 and 1902 to a depth of 400 feet. Only gas was obtained. The company leased considerable land but did very little work.

Bear River Oil Wells. One well was drilled in Sec. 12, T. 1 N., R 3 W., close to the village of Capetown. Three wells were drilled in Sec. 16, T. 1 N., R. 2 W. The wells were drilled to a depth of a few hundred feet, but no oil was obtained, and the works were abandoned.

Briceland Oil and Land Company's Well. This well is situated 5 miles southeast of Garberville and was drilled to a depth of 2100 feet. Oil sands at 410 feet were encountered carrying a little oil and at 503 feet the drill entered granite. The remaining 1597 feet of the well were drilled in the granite formation. The well was abandoned.

There are many seepages of oil throughout the region, occurring at points of fracture in the formation, some being in the Mattole River and a number in the creek beds. The oil is light, and no doubt much of it has evaporated. Not being of an asphalt base, the dark stain is not so apparent in the discoloration of the sandstone formation at these points of seepage. On breaking the sandstone, the odor of petroleum is very noticeable. Considering the broken condition of the sandstone and shale formations, the amount of oil seeping from the fractures is very small compared with other oil fields. The oil sands are rather thin so far as proven. This is also true of the oil-bearing shales of the district.

The wells drilled heretofore have not been located with any geological skill. Most of them have been drilled in close proximity to a fracture in the formation where oil was exuding. In other instances money



PORTION OF
HUMBOLDT COUNTY
SHOWING
OIL OCCURRENCES

CALIFORNIA STATE MINING BUREAU
F. McN. Hamilton, State Mineralogist
R. P. McLaughlin, Chief of Petroleum Dept.

has been wasted in the drilling operations. The instance of a well being drilled in granite will serve to illustrate this point.

The dip of the formation is mostly to the northeast, but at Briceland there is a section of sandstone having a dip to the southwest. A company is now said to be organizing under the direction of Briceland people to drill in this formation. Aside from this, there is at present no activity in the oil district of the county. Many reasons for the failure to continue drilling in this field have been advanced, among them being the withdrawal of the land from sale and holding it as mineral land subject to entry as such. Taken together with expensive transportation and competition with cheap oil from Pennsylvania, these two causes are said to have been the reasons for quitting in 1867. However true this may be, it remains to be proven that there are wells in the district that are capable of producing oil in sufficient quantities to pay to work them commercially, even under favorable conditions. So far, only small producing wells have been found.

Bibl.: Report VII, pp. 195-200; VIII, p. 216; X, 207; XI, pp. 227-232; Bull. 19, pp. 161-166; Bull. 69, pp. 444-454.

OCHRE.

There are deposits of red ochre of good quality near Garberville and also 8 miles from Ferndale. No development has been done.

MENDOCINO COUNTY.

Field Work in October, 1913.

BRICK AND TILE.

Brick and tile were manufactured at one time near the coast at the town of Mendocino and also at the county seat, Ukiah. Good clay deposits are available at these places but the demand for the product was not sufficient to make the business a profitable one, consequently the yards closed down. All brick and tile are now imported into the county from San Rafael by way of the California Northwestern Pacific Railroad.

COAL.

Lignite is found at several localities in the county, where it usually occurs in thin seams from a few inches to a foot in thickness. Three parallel beds of lignite traverse the county in a direction parallel to the coast line.

The most western bed lies 12 to 25 miles inland from the coast. There are croppings of this bed at Dooling's Canyon, Ackerman Creek near Ukiah, in Walker Valley 4 miles south of Willits, at the head of Ten Mile River, on Mill Creek and also in Humboldt County. This bed consists of small seams of coal of good quality but does not occur in payable quantities. Some of the coal will coke and some has been used in blacksmiths' forges with success.

The third bed lies 15 to 20 miles still farther inland and contains a vein of considerable thickness. The *principal* outcrop occurs on the middle fork of the Eel River near the mouth of Salt Creek and about 4 miles from the railroad at the forks of South Fork and Middle Fork of Eel River. This bed of coal has been traced for a distance of 10 miles, 7½ miles being on patented land owned by James Flood and 2½ miles on patented land owned by W. P. Thomas and associates, of Ukiah. Four or 5 miles of the croppings have been proved up, and, as far as developed, the vein appears to average about 16 feet in thickness. The bed begins in Sec. 9, T. 22 N., R. 13 W., and takes a southeast direction for 10 miles to Sec. 36, T. 21 N., R. 13 W., cutting across the middle fork of Eel River. The croppings on the river opposite Salt Creek have been developed to some extent and found to dip 31° northeast. The thickness at this point is 14 feet, with a seam of whitish slate 3 to 6 inches thick near the middle. The section of the formation here shows the following strata:

Top stratum not exposed.	
Blue clay shale weathering to small fragments	26 feet
Coal of good quality and luster	5 feet 6 inches
Soft white slate containing sulphate and carbonate of lime	3 inches
Coal of dull luster	8 feet
Sticky blue clay containing minute shells	21 feet
Some clay containing oyster shells	1 foot
Soft gray agglomerate containing clay, fragments of serpentine and sandstone	5 feet 6 inches
Soft greenish metamorphic sandstone	30 feet
Serpentine beneath.	

In a cliff, about 80 feet high which is about 1000 feet up the river, a hard greenish metamorphic rock is exposed, the strata of which seem to lie conformably upon the coal. About ½ mile north from the croppings and about 300 feet above the river several openings in the hill have been made and a tunnel said to be 400 feet long has been run on the vein in a direction of N. 10° E. About 50 feet of this tunnel is still open but the rest has caved. Sixty feet above the mouth of this tunnel, an incline shaft has been sunk on the dip of the vein to a depth of 30 feet. This shaft is in coal all the way, being 7 feet high, with coal exposed in both the roof and floor.

Below the coal bed and to the west of the workings a hard metamorphic sandstone is exposed but its position and thickness could not be judged. A few hundred feet east of these openings, metamorphic rock again occurs and rises in the form of a cliff 400′ to 500′ high, forming a sentinel rock for the surrounding country. It is to be noted that the coal occurs in a seam between the beds of highly metamorphosed rock without itself having undergone any great change in structure or composition.

Coal also outcrops about 1 mile southeast of the mouth of Salt Creek. The underlying stratum here is a white colored rock composed of a mass of broken shells and the strike is south 35° east. Still another mile up the creek, there is another outcrop on which some prospect holes have been sunk to prove up the seam. The coal has been traced northwesterly from the river and the same vein is supposed to extend into Round Valley. The coal along the Eel River appears to be of the Cretaceous age, while the coal of Round Valley appears to belong to the Tertiary period. The Round Valley coal is a bright, glistening variety with concoidal fracture. It contains little ash and a high percentage of carbons and stands transportation well.

The coal along this belt is no doubt a valuable asset to the county and, now that transportation is within a reasonable distance, it remains to be seen if it can be mined and put on the market at a sufficiently low cost to compete with the present coals and petroleum.

Louis Falkenau, State Assay Office, Safe Deposit Building, Room 16, southeast corner California and Montgomery streets.

No. 14,357. San Francisco, August 2, 1890.

J. L. Flood, Esq.,

Dear Sir: I have made a careful technical analysis of a sample of coal received from you marked "Eel River Coal Mine, Mendocino County," and a sample marked "Wellington," with the following results:

	Eel River	Wellington
Specific gravity	1.302	1.300
Moisture	7.9 per cent	2.4 per cent
Volatile combustible	36.2 per cent	33.45 per cent
Fixed carbon	53.5 per cent	58.6 per cent
Sulphur	0.4 per cent	0.15 per cent
Ashes	2 per cent	5.4 per cent

The cokes furnished by the two coals (sample of which I hand you with this report) are the same in appearance, but that of the Eel River coal contains 3.6 per cent of ashes, while that of the Wellington contains 8.4 per cent.

The Eel River coal weighs 81 pounds per cubic foot and in place 24.7 cubic feet will weigh a ton of 2000 pounds, but to store a ton, about 42 cubic feet will be required.

As the sample of Eel River coal is, according to your statement, from the surface exposed to extraneous moisture it is to be assumed that the coal at greater depth will contain much less moisture. If the Eel River and Wellington are both figured to dry coal, their carbon compares as follows:

	Eel River	Wellington
Volatile combustion	39.73 per cent	34.42 per cent
Fixed carbon	58.19 per cent	60.04 per cent
Total carbon	97.92 per cent	94.46 per cent

From the foregoing I consider sample of Eel River coal as equal to the Wellington for domestic use and as fuel for steam boilers.

Yours respectfully,

(Signed) Louis Falkenau.

August 11, 1890.

Analysis of Two Samples of Coal for Geo. R. Wells, Esq.

	"A"	"B"
Water	6.70 per cent	2.55 per cent
Volatile carbonaceous matter	52.89 per cent	62.01 per cent
Fixed carbon	38.66 per cent	29.64 per cent
Ash	1.75 per cent	5.80 per cent
	100.00 per cent	100.00 per cent
Sulphur	2.49 per cent	1.81 per cent

The sulphur is present in the form of sulphates of lime.

By the combustion of two samples of coal of 1 pound each, the following quantities of water were evaporated:

Sample 1.—13.86 pounds. Sample 2.—12.8 pounds.

Both samples form a good soft coke.

Thomas Price & Son.

STATE ASSAYER'S OFFICE.

SAN FRANCISCO, December 8, 1870.

Analysis of coal from vein running through Eel River to Round Valley:

S. W. Glazier, Esq. (for the company),

DEAR SIR: I have made a careful analysis of a specimen of coal received from you and have arrived at the following results:

Specific gravity	1.282
Volatile combustible substance	40.20 per cent
Fixed carbon	49.70 per cent
Moisture	6.70 per cent
Ashes	3.00 per cent
Sulphur	0.40 per cent

Amount of gas evolved, 37 cubic feet for 10 pounds Avd. of the coal.

The coal burns freely, yields a fire light and compact and sonorous coke, and its ashes are of a reddish-gray color and do not slag.

The amount of sulphur is so minute that it does not make itself perceptible to the smell in burning the coal.

Respectfully yours,

L. FALKENAU, State Assayer.

COPPER.

Copper mining is dormant. There are several prospects where slight development has been done, but these workings have caved in and are practically abandoned. Among the prospects that have received some attention may be mentioned the following:

Eden Valley Copper Mine. This mine is sometimes called the Deep Hole copper mine and is situated in Sec. 13, T. 20 N., R. 12 W., M. D. M., in the Eden Valley mining district at an elevation of 2500 feet. It is owned by W. P. Thomas and associates of Ukiah. There are two claims, comprising 40 acres, located in 1900.

Three or four small veins from four inches to a foot in thickness strike northwest—southeast and dip 22° northeast. The veins are composed of quartz carrying chalcopyrite in one vein and carbonates in another. The ore averages about 10 per cent copper. The hanging-wall is a soft slate and the footwall is a quartzite. Two hundred feet of the vein has been proven on the surface. There is a 40-foot shaft which cuts three veins. No work has been done for the last seven years. A cabin, bunkhouse, blacksmith shop, and barn are on the property.

Native Copper Mine. This is a prospect situated in Lost Valley, and at one time owned by C. H. Staut of Ukiah. The only work that has been done consists of trenching. It has been idle for some years. The native copper is disseminated throughout serpentine which is also the country rock in this vicinity.

Salinas Copper Mine. This prospect is also in serpentine formation in Lost Valley and the strike is northwest—southeast, and the dip 65° NE. Some sulphide ore was taken out. It was owned at one time by C. H. Staut, but has not been worked for some years.

Red Buck Mine. This property is an extension of the Salinas mine and the development work consists of a 35-foot tunnel and a 50-foot winze from it, all of which has caved and been abandoned.

Red Mountain Group. This group consists of four claims situated 10 miles southeast of Ukiah on the ridge which divides the waters of the Russian River and those of Clear Lake and Cache Creek. There are two veins, located in 1890 and relocated from time to time. The formation is serpentine. One claim is developed by an open cut and a crosscut tunnel. Several small bunches of ore have been found in the cut showing green carbonates and metallic copper. An adjoining claim is developed by two shafts, one 100 feet and the other 50 feet deep. In 1896, carbonate ore was taken out above the 50-foot level in one shaft, and the shaft was extended to the 100-foot point, but no ore was exposed, the bottom being in sandstone and clay. From an incline several tons of low grade ore have been taken out. The former owners were Huff & Gibson of Ukiah. No work has been done for some years.

Ogle Copper Mine. This mine is situated in Anderson Valley mining district in T. 13 N., R. 12 W., and consists of 2000 acres of patented land. It joins the Redwood Copper Queen mine on the north. A 16-foot shaft in the center of the claim exposed carbonate ore. Not enough work has been done to demonstrate the width of the vein. Gossan can be traced through this property for a distance of a mile. Ogle Brothers of Ornbaun were the former owners.

McGimpsey Mine. Situated in Secs. 13, 17 and 18, T. 13 N., R. 12 W. The property comprises eight claims in a serpentine formation. Considerable copper stain is shown in the open cuts and, in a few places, red oxide of copper mixed with oxide of iron is seen. The former owner was C. P. McGimpsey of Ukiah.

Pieta Mine. This prospect consists of only one claim and is located 10 miles northeast of Cloverdale and 4 miles north of the southern boundary of Mendocino County. There is a 55-foot open cut across the vein material which strikes east and west. It has not been worked for years. The ore carries a slight trace of carbonate of copper and the gangue material is mostly iron oxides. The walls are serpentine. The former owners were J. C. Caldwell and associates of Healdsburg, Sonoma County.

Redwood Copper Queen Mine. This property, consisting of 840 acres of patented land, located in Secs. 17 and 20, T. 12 N., R. 13 W., M. D. M. It is 25 miles by wagon road from Cloverdale, which is the nearest railroad station. The country rock is a highly altered sandstone covered with a thick layer of soil. There is a heavy growth of timber on the land. Gossan croppings appear at several places. Development work has shown a mineralized zone 300 feet long, 10 to 40 feet wide and 125 feet deep, carrying kidneys and lenses of sulphide ore the size of a man's fist and larger. The largest kidney found was 75 feet long and six feet thick. The ore is a heavy iron sulphide carrying copper up to 8% or 9% and small values in gold and silver.

During the year 1906, 400 tons of ore were shipped to the Peyton Chemical Company plant for treatment. Its high sulphur content and the absence of arsenic made it desirable for the manufacture of sulphuric acid. The company is a San Francisco corporation of which E. R. Leach is president, and Claude Mellersh, secretary.

CHROME IRON.

There is a deposit of chrome iron in Sec. 24, T. 15 N., R. 13 W., M. D. M., about one and one half miles west of Ukiah. Very little work has been done to develop this deposit.

Chrome iron has also been found 12 miles north of Willits.

GOLD.

There is no mining for gold in Mendocino County at the present time. In former years there was some development work being done on the Boy Edgar and Van Allen mines but only the ever-present legends remain telling of good values and lost mines.

Boy Edgar Mine. This mine was worked some years ago by the owner, C. H. Staut of Ukiah, and is reported to have been rich in free gold. The ledge was lost and hunted for by prospectors but has never been found. It was supposed to be located somewhere on the trail from Ukiah to Lost Valley. C. H. Staut, the former owner, died several years ago.

Van Allen Mine. This property is situated 6 miles west of Ukiah at an altitude of one thousand feet. There are two claims named "Carrie" and "Fred." The strike of the formation is northwest and southeast and the dip 20° NE. There are five prospect tunnels. The one in which the last work was done is a crosscut tunnel 170 feet long. This tunnel has cut several stringers of quartz in a hard, tough blue glaucophane schist. Only assessment work is being done. Property is owned by William Van Allen of Ukiah.

There were several other prospects mentioned in the Thirteenth Report of the State Mineralogist. These, however, were merely locations and the assessment work lapsed soon after the locations were made, so they are not mentioned here.

MANGANESE.

There is a manganese deposit of considerable magnitude located in Secs. 22, 27, 34 and 35, T. 17 N., R. 12 W., M. D. M. Eight claims were located by W. P. Thomas, Requa, Taylor, and others in 1912. The vein is in quartzose schist and the strike is northwest and southeast and the dip 75° to 80° NE. The width varies from 3 feet to 20 feet. In 1912, one thousand dollars was expended in developing the claims and some work has been done every year on the property. Four hundred to 500 feet of the vein has been stripped and crosscut trenches have been cut for several hundred feet more.

The claims are 3 miles from the railroad and a wagon road passes within a mile and a half of it. The ore is of a high quality as will be seen from the accompanying analyses and no doubt will prove a valuable asset to the county at some future time.

Cleveland Property. It is situated 3 or 4 miles from the Thomas property in T. 17 N., R. 12 W., and on the same lode. The ore is a pyrolusite. No work is being done on the claims.

Manganese Assays From Property of W. P. Thomas.

Assay by John Crawford, chemist, for Noble Electric Steel Company, April 4, 1912:

Metallic manganese	52.24%
Dioxide	82.50%

Assay by Abbott A. Hanks, San Francisco, February 21, 1912:

Metallic manganese	54.07%
Dioxide	85.56%

Assay by Abbott A. Hanks, December 22, 1911:

Metallic manganese	56.23%
Dioxide	88.98%

Assay by Abbott A. Hanks, August 6, 1912:

Metallic manganese	56.67%
Dioxide	89.70%

Assay made by Geo. A. James Company, June 22, 1912:

Metallic manganese	52.1%
Dioxide	82.4%
Dioxide (with water removed)	91.2%

Assay by Geo. A. James Company, 28 Belden place, San Francisco, June 24, 1912:

Metallic manganese	54.9%
Dioxide	86.8%
Dioxide (with water removed)	92. %

MAGNESITE.

There are croppings of magnesite in Mendocino County, but they have not been developed. They occur in serpentine formation like most of the other magnesite deposits of California.

Vassar Magnesite Claims. These claims are located 12 miles north of Cloverdale in the southeastern part of the county and within 1½ miles of the California Northwestern Railroad. These croppings are in serpentine and are owned by James Vassar, who owns 1000 acres of ranch land on which the croppings occur. No development has been done. There is another cropping of magnesite in Mendocino County near the northern boundary of Sonoma County.

MINERAL SPRINGS.

There are several mineral springs in Mendocino County, having waters of medicinal properties, as well as some that are palatable as table waters. Some of the springs have well appointed accommodations for guests with excellent transportation equipment for visitors making use of them during the summer months. Some of these waters compare favorably with the famous waters of European resorts, as will be seen from the comparison of their analyses. The climatic conditions are unsurpassed and the scenery equally as beautiful as at other springs of the world.

Vichy Springs. These famous springs are located 3 miles easterly from Ukiah, in Sec. 15, T. 15 N., R. 12 W., and are reached by railroad from San Francisco to Ukiah, and thence by stage to the springs.

The waters belong to the alkalo-carbonated class, are clear and sparkling and of an agreeable pungent taste. Their chemical composition and action on the human body are almost identical with the noted Ems on the Lahn, and Fachingen of Nassau, Germany, also Vichy of Grand Grille, France.

It will be observed from a chemical analysis made of these waters that they are heavily charged with carbonic acid gas and carbonates, and that they contain some iron and potassium salts.

Analytical Comparison of Vichy Springs.

Solid ingredients in one gallon of 231 inches in grains	California Vichy analyzed by Dr. Anderson. Temperature 93 degrees F.	Grande Grille, France, Vichy, analyzed by Broquet. Temperature 105.8 degrees F.	Fachingen, Nassau, Germany. Analyzed by Frisenius. Temperature not given	Ems on the Lahn, Germany. Analyzed by Fresenius. Temperature 115 degrees F.
Sodium chloride	28.60	32.80	36.48	62.16
Sodium carbonate	195.52	208.00	155.84	84.24
Sodium sulphate	.36	18.32	1.12	trace
Sodium phosphate		6.24	.41	
Potassium chloride	.09			
Potassium carbonate	trace	16.32		
Potassium sulphate	trace			3.03
Magnesium carbonate	19.75	11.04	10.85	6.80
Calcium carbonate	18.14	18.48	16.09	10.00
Ferrous carbonate	.07	.16	.64	.16
Strontium carbonate		.08	trace	trace
Barium carbonate				trace
Lithium carbonate			trace	
Borates	trace			
Arsenates		.08		
Aluminates	trace		trace	trace
Silica	5.92	.40	2.09	2.88
Totals	268.45	311.92	223.52	169.27
Cubic inches of gases:				
Carbonic acid gas	224.75	14.74	263.76	54.24

California Seltzer Springs. These springs are located in the coast range of mountains in southern Mendocino County, twelve miles north of Cloverdale, Sonoma County. There is a hotel on the property. The waters are carbonated and sparkling, and are quite palatable. An analysis by Winslow Anderson, M.D., gives the following:

	Grains per U. S. gallon
Sodium chloride	17.15
Sodium bicarbonate	53.00
Magnesium carbonate	44.60
Calcium carbonate	72.40
Ferrous carbonate	trace
Silica	trace
Organic matter	trace
Total solids	187.15

Temperature, 57°.
Free carbonic acid gas, 18.00 cubic inches.

Orr's Mineral Springs. These springs are situated 15 miles northwest of Ukiah, on the headwaters of Big River, in Sec. 24, T. 16 N., R. 14 W., at an altitude of 1000 feet. They are reached by rail from San Francisco to Ukiah, thence by stage to the springs. The hot sulphur baths are well known. Springs for drinking and bathing purposes occur, varying in temperature from cold to 107° F.

Reported Analysis of Orr's Mineral Water.

	Grains per U. S. gallon
Silica	1.917
Silicate of soda	15.502
Oxide of lime	.425
Carbonate of lime	.367
Sodium carbonate	.175
Sodium chloride	1.909

There are three springs called the "Cold Sulphur," "Hot Sulphur," and "Iron Spring." The "Hot Sulphur" water has a temperature of 106° F.

Duncan Springs. The springs are located 1½ miles southwest from Hopland Station, in Sec. 25, T. 13 N., R. 12 W. Hopland is on the California and Northwestern Railroad and stages connect with trains. There are five cold springs on the property, two of which are soda, and one a sulphur spring. The other two are called the "Borax" and "Duncan" springs, the latter being the principal one. The water from this spring is claimed to be similar to the celebrated Bartlett Springs.

Reported Analysis of Duncan Springs.

	Grains per gallon
Bicarbonate of magnesia	90.11
Chloride of magnesia	1.41
Sulphate of magnesia	1.64
Bicarbonate of lime	15.64
Silica	6.94
Bicarbonate of potash	2.37
Bicarbonate of soda	2.37
Free carbonic acid	36.57
Total	157.05

Garby's Springs. These small alkali springs are situated at the base of the foothills, one mile west of Ukiah.

Lane's Springs. These are located in Redwood Valley near Calpella. The waters have an alkaline but pleasant taste.

OIL.

Some drilling for oil was conducted in the county during the oil excitement in the years 1865, 1866, 1867, but no oil in paying quantities was obtained. The oil was of excellent quality. Experiments were made with the bituminous sandstones to see if oil could be distilled from them in payable quantities. The experiments yielded a fair percentage of oil but the cost of production and freight to the consumer was too high to be a profitable venture.

These bituminous sandstones have been developed, mostly in the neighborhood of Point Arena. The beds in that region are 20 feet thick and yield from 10% to 11% volatile matter. Picked specimens run as high as 15% in volatile matter, but the bituminous sandstones as a whole are not sufficiently impregnated with petroleum to compete with other deposits of the State.

QUARRIES.

There are no quarries operating in the county at the present time. The best quality of road metal being used in Mendocino comes from Petaluma, Sonoma County. The metamorphic rocks of the county are not suitable for road building.

PART IV.

The Counties of

Fresno, Kern, Kings
Madera, Mariposa
Merced, San Joaquin
Stanislaus

By WALTER W. BRADLEY, G. CHESTER BROWN, F. L. LOWELL, R. P. McLAUGHLIN
Field Assistants

INTRODUCTION.

The group of counties presented in the chapters herewith covers the great San Joaquin Valley section of California, from its junction with the Sacramento River to its extreme southern limits (except Tulare County, for which the field work is not yet completed). It extends into the Coast Range Mountains on the west, to the summit of the Sierra Nevada Mountains on the east, and into the desert region for a short distance south and southeast of the Tehachapi where those two mountain systems come together. In this district are found such natural wonders as the Yosemite Valley, the Mariposa and General Grant Park Big Tree Groves, the Kings River Canyon and the Devil's Post Pile. Of mineral and geologic interest, we find the southern end of the great Mother Lode Gold Belt; also the Kern and Fresno County oil fields, the two largest petroleum producing districts in California. This branch has already been covered in a special report. In the valley sections, of course, agriculture is the dominant industry; dairying also is prominent. Both in the valley and in the mountainous sections stock raising is an important industry.

The valley is traversed north and south by two transcontinental railroad systems, and tapped at its northern end by a third. Several oil pipe lines carry the product of the wells to refineries and distributing points at tidewater.

This report represents the results of about three months' field work by the several authors, more or less simultaneously in their various areas, during the late summer of 1914. We have here endeavored to record all of the mineral resources and properties which have been the subject of commercial exploitation, as well as to mention some additional occurrences, as yet undeveloped.

Acknowledgment is here made of assistance rendered by the various owners and operatives of properties, both during the field work and in the subsequent preparation of this report.

FRESNO COUNTY.

By WALTER W. BRADLEY, Field Assistant.

Field Work in August and September, 1914.

Fresno County was created April 19, 1856, and up to 1893 included the territory now in Madera County. In the early days, Millerton, now abandoned, near Friant, was the county seat. It is still among the larger counties of the State, having an area of 5977 square miles, or nearly three times that of the State of Delaware. Madera and Merced counties are on its north, Mono and Inyo on the east, Tulare and Kings on the south, with San Benito, Monterey, and San Luis Obispo adjoining it on the west. The San Joaquin River separates Fresno from the first named county, and the eastern boundary runs along the summit of the Sierra Nevada Mountains. Along this line are numerous peaks

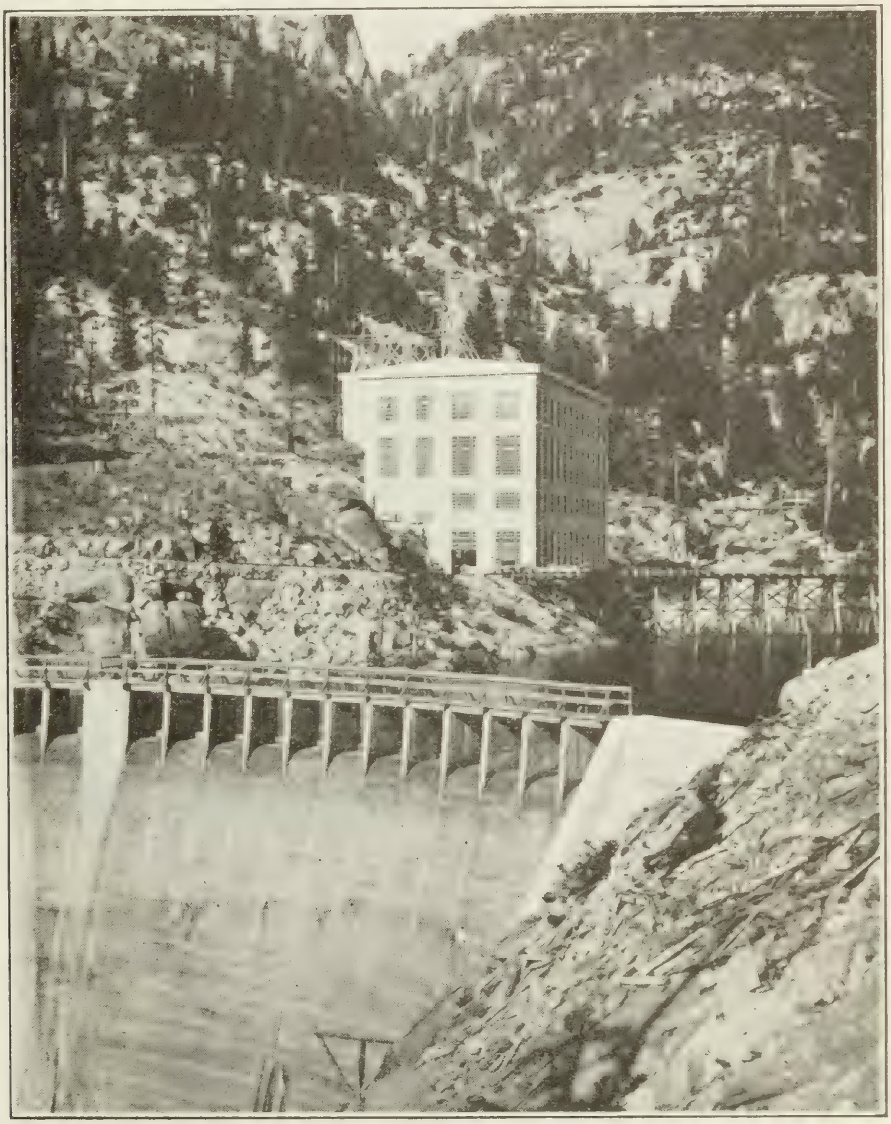


Photo No. 68. No. 1 power plant of Pacific Light and Power Company, at Cascada (Big Creek Post Office), Fresno County. Dam retains water for No. 2 plant, five miles below.

exceeding 13,000 feet in elevation above sea-level, among which may be mentioned Mt. Abbott, 13,736 feet; Bear Creek Spine, 13,705 feet; Mt. Humphreys, 13,972 feet; Mt. Darwin, 13,841 feet; Mt. Powell, 13,361 feet; Agassiz Needle, 13,882 feet; Mt. Winchell, 13,749 feet; North Palisade, 14,254 feet; Middle Palisade, 14,049 feet; Mt. Pinchot, 13,471 feet, and University Peak, 13,588 feet. At the Kearsarge Pass the trail to Independence in Inyo County crosses the divide at an elevation of 11,823 feet. The western boundary of the county follows along inside of the first line of ridges of the Diablo Range, just back from the edge of the San Joaquin Valley.

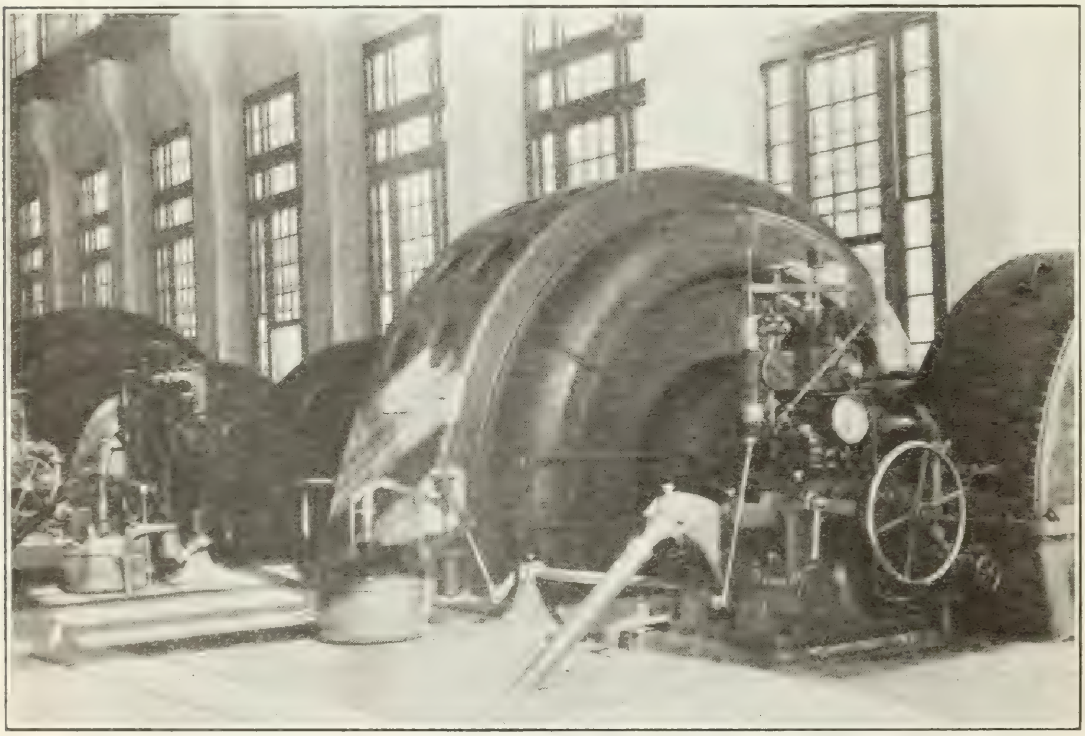


Photo No. 69. Generators and water wheels, No. 1 power plant, Pacific Light and Power Company, Cascada, Fresno County.

The main drainage systems of Fresno County are those of the San Joaquin and Kings rivers and their branches. Much has been written and much more could be written of the wonder and rugged grandeur of the Sierran streams, canyons, cliffs, peaks and snowfields, delightful camping spots and unexcelled trout fishing—but they are here merely mentioned in passing. The streams of the western side of the county are only seasonal creeks, being dry in summer and lost sight of in the valley flats, except in times of exceptional winter rains.

In the valley proper, with water drawn from the San Joaquin and Kings River systems (principally the latter), over 400,000 acres of land are under irrigation. The various systems serving the county comprise some 450 miles of main ditches, with capacity exceeding 6000 cubic feet per second; also about 5000 miles of distributing canals. Water is sold at the rate of 62½ and 75 cents an acre yearly. The census of 1910 showed 888 pumping plants in the county, with a capacity of 515,380 gallons per minute, and the cost varies from $1.50 to $4 per acre. The number of pumping plants has increased rapidly since 1910. The Hume-Bennett Lumber Company, with a 75-mile flume, utilizing water from the Kings River, transports lumber from its mill at Hume to the railroads at Sanger. Its production is approximately 35,000,000 feet per year. The Fresno Flume and Lumber Company, with mills of an equal capacity at Shaver, ship via a 45-mile flume to Clovis. The water discharged from these flumes at their terminals is used for irrigation in the valley.

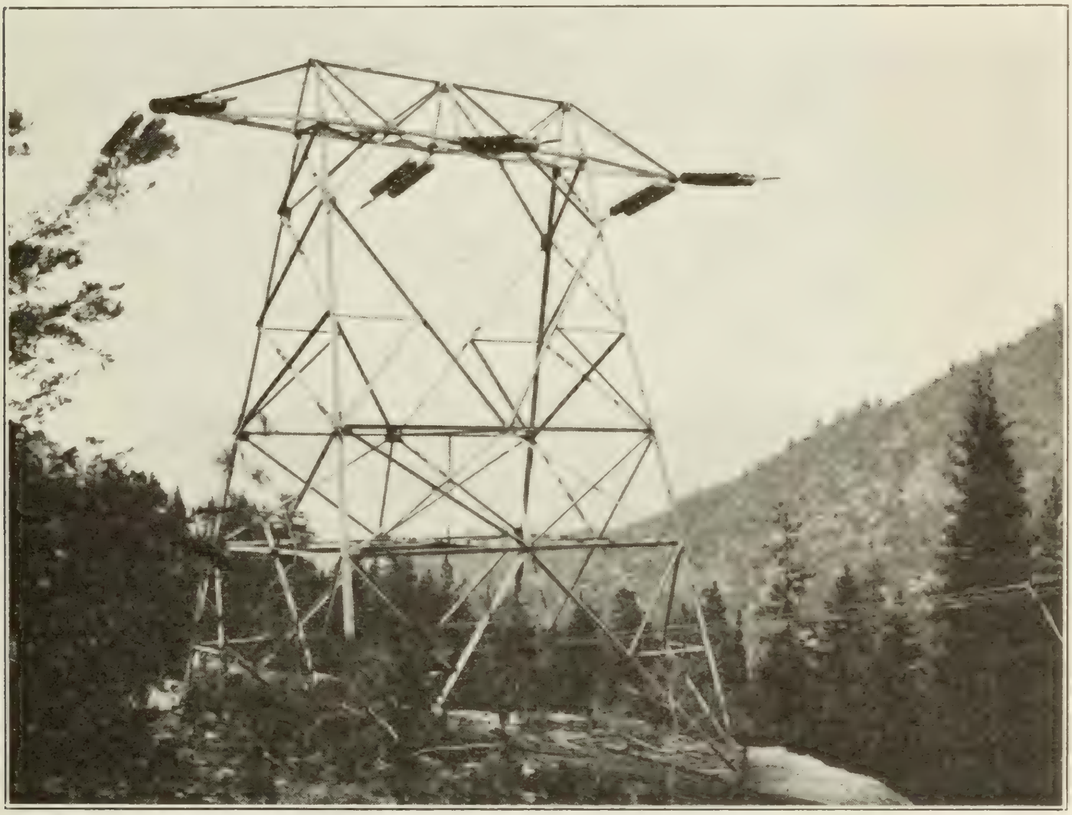


Photo No. 73. Transmission tower, 150,000 volts. Pacific Light and Power Company, near Cascada, Fresno County.

As to power for mining, industrial and agricultural purposes, this territory is well provided. Besides the electric power lines, many pumps for irrigating are driven by distillate engines and some by crude oil, the proximity of the oil fields at Coalinga being an advantage. The San Joaquin Light and Power Corporation distributes 40,000 horsepower in Fresno County, provided by two hydroelectric plants in Madera County and a steam plant in Fresno. Its main transmission is at 60,000 volts to its substations. In addition this company has power plants in Kern County. The Pacific Light and Power Company, though it does not distribute any power in Fresno County, has two hydroelectric plants on Big Creek, a branch of the San Joaquin River. These two plants are each ultimately to have 60,000-kilowatts capacity, one half of which being at present installed and in operation. No. 1 plant (see photos Nos. 68 and 69) at Cascada (Big Creek post office), operates with a static head of 2104 feet (950 pounds per square inch, gauge pressure at the water wheels); while No. 2 plant, 5 miles below, has a 1900-foot head. The power is taken through to Los Angeles by a 150,000-volt transmission with aluminum cables on steel towers (see photo No. 73).

The county is traversed by two transcontinental railroad systems—the Southern Pacific and the Santa Fe. There are six oil pipe lines transporting crude oil from and through Fresno County. The Associated Oil Company has two 8-inch lines to Port Costa and a 6-inch line to Monterey. The Standard Oil Company has two 8-inch lines to Point Richmond, and the Producers Transportation Company has an 8-inch line to Port Harford. The Shell Oil Company is building an 8-inch line to Martinez.

The farm, fruit and lumber products of Fresno County at the present time total about $30,000,000 in value annually. Its total mineral product for 1913 was valued at $8,438,810. The total recorded mineral output of the county to the end of 1913 (see table opposite) is $67,669,637, from which we have deducted $1,375,000 gold and silver yielded from 1880–1892 by the territory then in Fresno, but now a part of Madera County. This leaves a net value of $66,294,637. The products in the order of their value to date are: petroleum, stone industry, copper, brick, gold, magnesite, mineral water and silver, with asphaltum, chrome, clay, coal, gypsum, gems, natural gas, and quicksilver, making up the list, combined under "miscellaneous and unapportioned." In addition, occurrences are known of asbestos, marble, pumice, limestone and tungsten, but they are as yet undeveloped.

ABRASIVES (see Volcanic Ash).

ASBESTOS.

J. E. Ellwood of Sanger, reports that he has a deposit of amphibole asbestos 30 miles east of Sanger. It is undeveloped.

Hogue and Phillips Claim. R. L. Hogue, Fresno, and Mr. Phillips, Letcher, owners. Some small bunches of asbestos have been taken out from this prospect in T. 13 S., R. 23 E., 12 miles north of Sanger.

Bibl.: Bull. No. 38, p. 262.

ASPHALT.

There is no natural asphalt occurring in Fresno County, but the manufactured article is obtained from the residue in the refining of crude petroleum. In the earlier statistical reports its value was given,

FRESNO COUNTY—Table of Mineral Production.

Year	Gold. Value	Silver. Value	Copper		Petroleum		Brick		Stone industry, Value	Mineral water		Magnesite		Miscellaneous and unapportioned	
			Pounds	Value	Barrels	Value	Thousands	Value		Gallons	Value	Tons	Value	Kind	Value
1880	$143,433														
1881	90,000													Unapportioned, 1900-1909, inclusive	$268,534
1882	80,000														
1883	100,000														
1884	80,000														
1885	74,500	$2,456													
1886	151,186	2,701													
1887	205,242	274													
1888	200,000	2,800													
1889	185,988	4,629													
1890	49,951	1,816													
1891	82,607	10,396													
1892	112,981	6													
1893	7,118														
1894	8,202													216 tons coal 500 tons gypsum	700 4,000
1895	47,249													600 tons gypsum	4,800
1896	28,235	100			14,119	$56,750				1,200	$400			50 tons gypsum	400
1897	43,144				70,140	70,840				1,886	350				
1898	27,557				154,000	154,000	2,500	$18,000		2,000	900			100 tons gypsum	600
1899	18,142				439,372	439,372	5,500	38,500		2,000	900			16 tons asphalt	320
1900	22,346	479			547,960	547,960	4,250	35,062		5,000	4,000				
1901	21,462		1,159,672	$182,648	525,433	236,444	5,000	35,000		5,142	5,142				
1902	54,427		3,000,000	345,000	571,233	199,931	6,000	45,000		5,000	4,500				
1903	21,538	111			2,214,160	730,673	8,000	68,000	$11,038	7,200	7,200			839 tons asphalt	10,068
1904	7,809	4	2,500	319	5,114,958	1,520,847	4,800	32,400		4,800	2,400	38	$120	579 tons asphalt	6,948
1905	40,037	9,187	1,440,000	224,640	8,890,000	2,400,300	9,000	60,000							
1906	8,493	83	440,000	88,000	8,402,000	1,974,470	8,000	64,000							
1907	2,401	26	250,000	50,000	9,050,300	3,620,120	9,230	57,350	10,500						
1908	1,054	11			10,725,389	5,898,964	13,220	106,960	16,900					500 tons asphalt 9,000 tons clay	5,500 26,000
1909	17,539	8,503	876,837	111,341	15,406,619	9,243,971	7,950	49,375	28,400			850	8,500	400 tons asphalt	4,400
1910	3,373	2,980	486,725	61,999	18,651,470	9,277,241	9,533	76,267	58,089			1,400	22,400	200 tons asphalt Gems	2,600 750
1911	17,441	81			19,499,611	9,344,085	4,500	28,500	318,911			220	2,195	Gems	250
1912	6,094	23			19,510,932	8,487,255	5,000	40,000	307,158			2,000	20,000	50 tons chrome Gems 336 flasks quicksilver Gas	950 700 14,125 21,380
1913	2,846	15			18,956,965	7,927,736	5,500	44,000	416,437			1,135	9,080	375 flasks quicksilver Gas, 236,100 M cubic feet	15,086 23,610
Totals	*$1,962,395	†$46,681	7,655,734	$1,063,947	138,744,661	$62,130,959	107,983	$798,414	$1,167,433	34,228	$25,792	5.643	$62,295	Total miscellaneous	$411,721
	1,350,000	25,000													
	$612,395	$21,681													

†Of this about $25,000 came (1880-1892) from that part now in Madera County.
*Of this about $1,350,000 came (1880-1892) from that part now in Madera County.

Totals.

Gold	$612,395
Silver	21,681
Copper	1,063,947
Petroleum	62,130,959
Brick	798,414
Stone industry	1,167,433
Mineral water	25,792
Magnesite	62,295
Miscellaneous and unapportioned	411,721
Total to end of 1913	$66,294,637

but as it is included in the value of the crude oil from which it is derived, refined asphalt is not now entered independently; to do so would result in a duplication. The California Fresno Oil Company, A. Buttner, Fresno, manager, is the only refinery producing asphalt in this county. Its output is small.

BRICK AND CLAY.

Boger Gravel Pit (see under Stone Industry).

Craycroft-Herrold Brick Company. C. J. Craycroft, president; F. J. Craycroft, secretary; office, 407 Griffiths-McKenzie Building, Fresno.

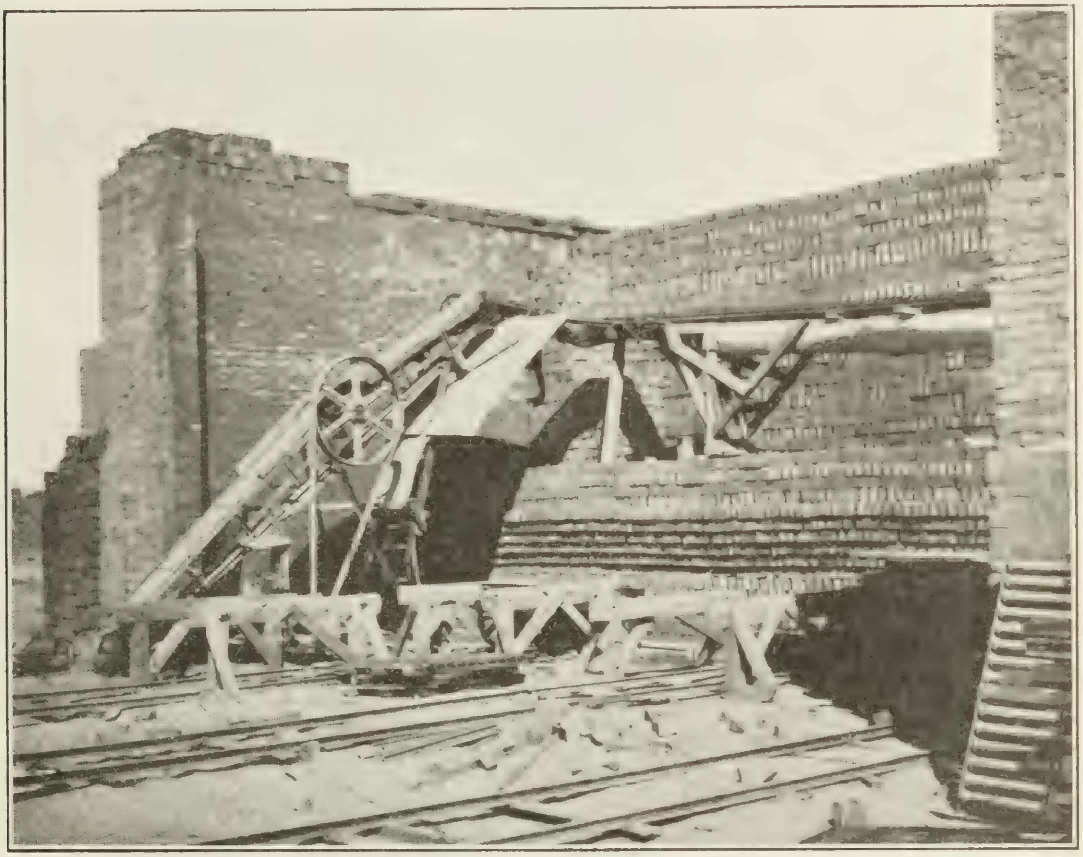


Photo No. 27. Brick elevator and conveyor, (electric driven), for charging kiln. Craycroft-Herrold Brick Company, Fresno County.

The plant of the company is at Crayold siding on the Kerman branch of the Southern Pacific Railroad, 3 miles west of Fresno. Under the name of C. J. Craycroft & Son Brick Company, a plant was formerly operated about 1 mile south of town. The present plant, which started in 1911, has a daily capacity of 50,000, and electric power is used. The clay is obtained from a superficial, flat valley deposit about 5 feet thick. It is loosened by pick and shovel and trammed to the mill where it is ground and passed through a stiff-mud machine.

The rectangular stream of stiff mud is cut up by a wire cutting brick machine (see photo No. 25), from which it passes onto a belt conveyer.

As the conveyer moves slightly faster than the mud stream, the bricks are separated so that they can be easily taken up by hand and transferred to cars and then run to the drying sheds. They are burned in field kilne having permanent side walls, and oil-fired (see photo No. 28). An electric driven elevator and conveyor is used in charging the kilns (see photo No. 27). There are 7 field kilns with a capacity of 700,000 each, and one circular kiln for re-pressed brick. From seven to ten days are required to burn a kiln. During seven months twenty-five to forty men are employed, according to the market demands, and five to ten men the balance of the year. The present outlook of the business is quiet.

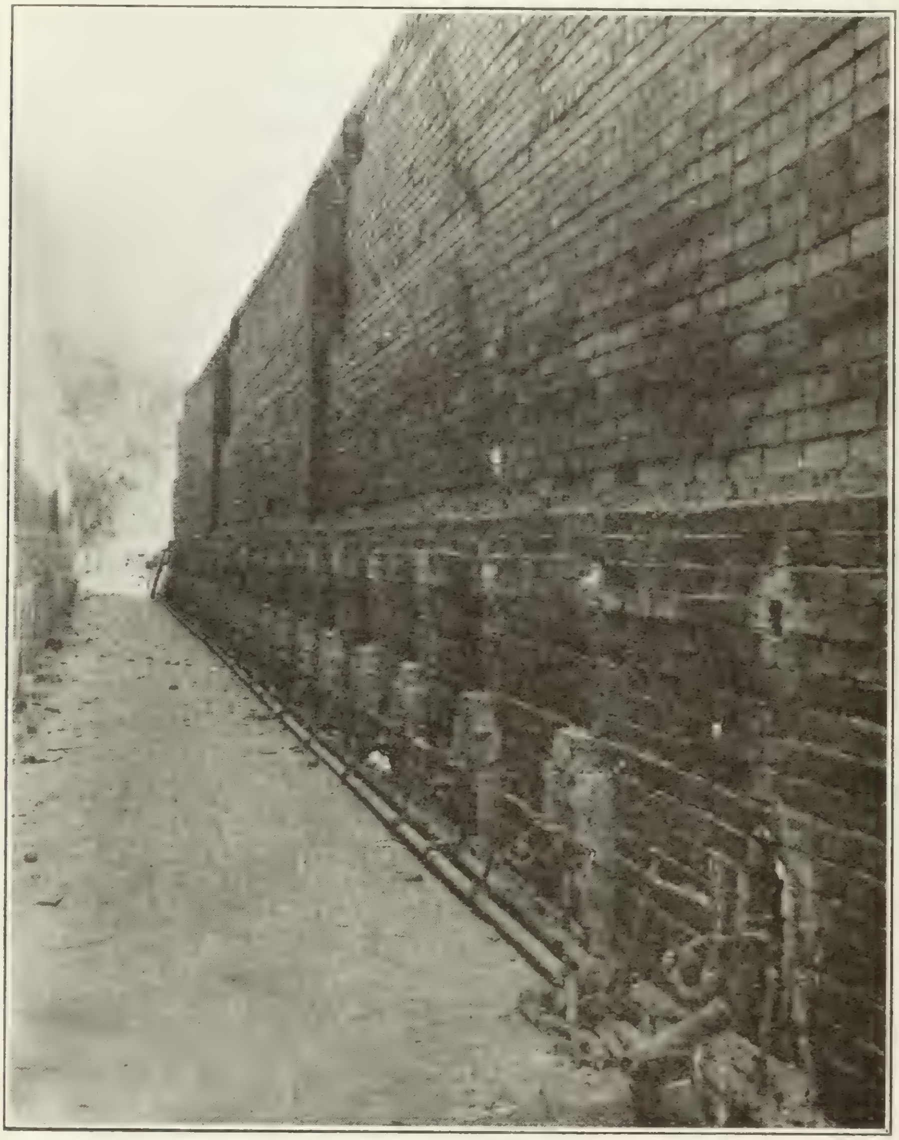


Photo No. 28. Crude oil burners for brick kiln, Craycroft-Herrold Brick Company, Fresno County.

Bibl.: Bull. No. 38, p. 242.

Fresno Brick and Tile Company. F. Dean Prescott, president; E. M. Prescott, vice president and manager; James A. Douglas, superintendent. Office, H and Mono streets, Fresno. The plant is at Mars siding on the Southern Pacific, about 1 mile southeast of the city limits. This company formerly operated north of town. The clay is loaded by hand to side-tipping cars and drawn by horses to the storage bin. After coming from the brick machine (see photo No. 25), most of the product is sun-dried, but some by steam. There are six field kilns, three of which have permanent side walls, and are oil-fired (see photo No. 28). Their capacity is 600,000 per kiln and seven days are required for burning. An average of thirty-five men are employed.

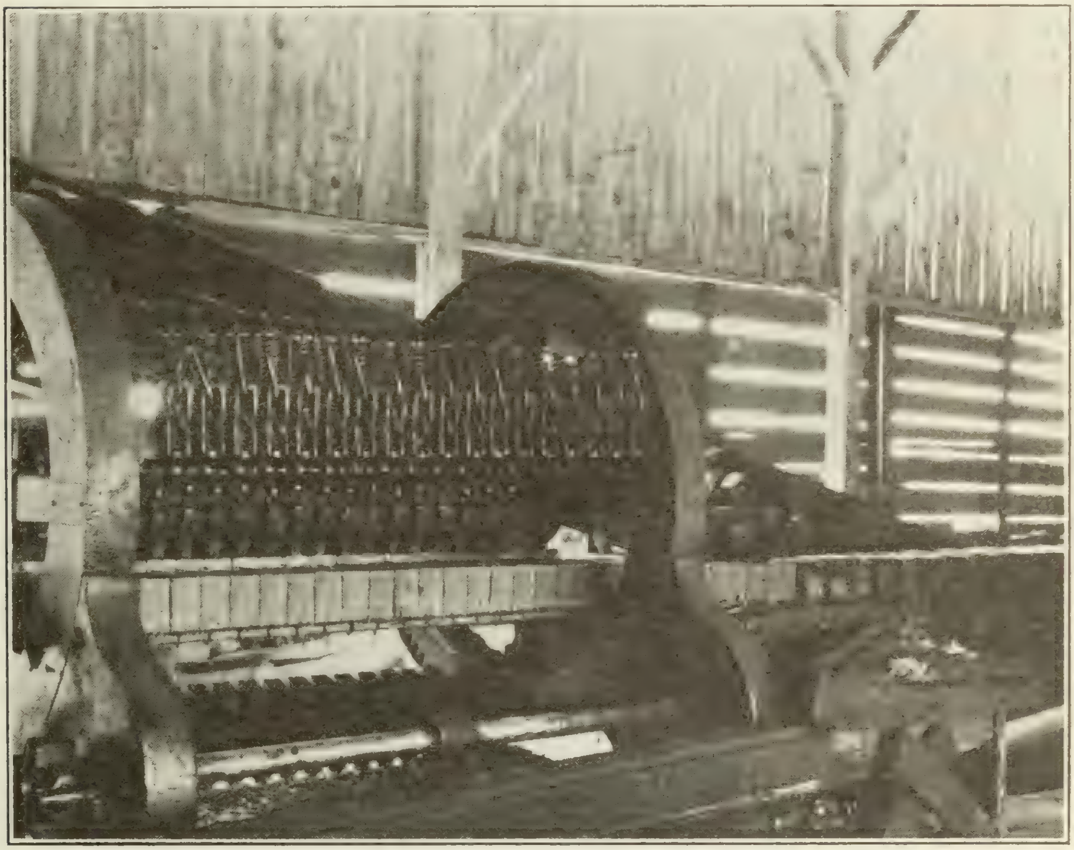


Photo No. 25. Wire brick cutting machine, Fresno Brick and Tile Company, Fresno.

Bibl.: Bull. No. 38, p. 243.

CHROMITE.

Chromite occurs in a serpentine belt near Sentinel in T. 11 S., R. 23 E., and running southeasterly into T. 12 S., R. 24 E. The Copper King Mines Company, when operating its smelter, used chromite from this vicinity.

Frank Alexander, of San Francisco, has some claims in the northwestern part of Watt Valley, from which chromite has been shipped, but none recently.

Victor Roberts, of Coalinga, has a deposit of chromite in Sec. 9, T. 22 S., R. 14 E., southwest of Coalinga. There is said to be a large deposit of good quality near the center of T. 18 S., R. 13 E., northwest of Coalinga.

Bibl.: R. X, p. 189; XIII, p. 49; Bull. No. 38, p. 268; MIN. RES. WEST OF ROCKY MOUNTAINS, 1868, p. 224.

COAL.

In the southwest corner of Fresno County are two localities where coal occurs, and which were producing in the early nineties. In the Coalinga field, the San Joaquin Valley Company, west of Coalinga, was the principal producer, and in 1894 was shipping at the rate of 300 tons of coal per month, principally to Fresno. The other locality, known as the Priest Valley field, is near the junction of Fresno with San Benito and Monterey counties, and includes the Stone Canyon mine in the last named. This coal is semi-bituminous, while that of the Coalinga field is a lignite, as is most of the California coal.

With the rise of the petroleum industry our coal, because of its poor quality and its cost of mining, has been relegated to the background; in fact, its production has practically ceased entirely. No work has been done on the coal beds of Fresno County since 1896.

Bibl.: R. VII, pp. 148, 172; IX, p. 323; X, p. 186; XI, p. 217; XII, pp. 50–54; XIII, p. 53; Bull. 67, pp. 194, 196; U. S. G. S., Bull. 398, p. 49.

COPPER.

The principal copper district of Fresno County is in the southern extension of the ''Foothill Copper Belt,'' of the western edge of the Sierra Nevada Mountains. The only property here which has made any noteworthy yield of copper so far is the Copper King mine, described below. Because of the success of this one, a number of claims and prospects have been located in its neighborhood, but none of them have amounted to anything as yet, and they are all now idle. This district in 1865 made shipments amounting to 1440 tons of copper ore.

Farther back and near the summit of the main range of the Sierras the mineralized belt, which is more prominently known at The Minarets in Madera County, passes through Fresno County. In this belt copper ore has been found on Mt. Godard at an elevation of 12,000 feet above sea level; but owing to its inaccessibility it is undeveloped. Other occurrences are noted below.

Bibl.: R. VIII, p. 209; X, p. 194; XI, p. 217; XII, p. 66; XIII, pp. 58, 59; Bull. 50, pp. 277–289; Bull. pp. 17, 40; MIN. RES. WEST OF ROCKY MTS., 1868, p. 174.

Ackers Claim (see Expositor).

Black Jack Claim. V. F. Moore, Kingriver, R. F. D., owner. It is in Sec. 14, T. 12 S., R. 24 E., west of Trimmer, and located in 1910. It is stated that the ore zone is 150 feet wide, carrying 2½ per cent copper, with occasional high grade bunches. There is a small tonnage of high grade ore on the dump. Assessments only are maintained. There are two shafts, 125 and 20 feet, respectively, the former having two crosscuts and an 18-foot drift. The vein strikes northwest and dips 75° NE. The hanging-wall is schist and the footwall granite.

Copper King Mine (see Hart Copper Company).

Expositor and Summit Claims. Henry Ackers, Sanger, owner. About Sec. 10, T. 12 S., R. 24 E., 10 miles south of east from Letcher. There are two adits on the Expositor, 100 feet each, and a 60-foot shaft, the latter being filled with water when visited. On the Summit there is an adit of 140 feet. Both oxidized and sulphide ores occur. Assessments only.

Bibl.: R. XII, p. 66; XIII, p. 58.

Fresno Copper Mines (one time called Heiskell). Fresno Copper Company, Ltd., owner; C. C. Leavitt, manager, 585 Jean street, Oakland. This group of five claims is in Sec. 10, T. 12 S., R. 21 E., 4 miles east of El Prado on the Southern Pacific Railroad. There is an extensive surface equipment, including a smelter with two furnaces of 200 tons capacity each. The smelter has never been operated, as it is stated that about the time it was completed the ore was found to fall far short of its expected value. Steam furnished the power for the hoist and air compressor, while the pump, lighting plant, sawmill and shops were operated by electricity from the San Joaquin Light and Power Company. A more detailed description of the property is given in Bulletin No. 50. Idle since 1908.

Bibl.: Bull. No. 50, pp. 279–281.

Hart Copper Company (formerly Copper King, Ltd.). Truman Hart, president; A. W. Anderson, secretary; office, 716 Griffiths-McKenzie Building, Fresno. The mine, which is patented, is in Sec. 3, T. 12 S., R. 23 E., east of Letcher, and the smelter is at Seal Bluff Landing on Suisun Bay, Contra Costa County. Under the Copper King Company, operation of both the mine and smelter was a failure, but the present owners, who bought the property at a court sale, have shipped ore to a custom smelter and made a profit above the purchase price. No output has been made since early in 1908, but the roads and equipment are kept in repair and a watchman is employed. They report a fair tonnage of ore blocked out and that it is intended to resume shipments when the market and transportation facilities improve. At present it is a 17-mile haul to the railroad. See Bulletin No. 50 for a more detailed description.

Bibl.: R. X, p. 194; XII, p. 66; XIII, p. 59; Bull. 50, pp. 282–286.

Kenawyer Group. Mrs. V. Kenawyer, owner, Kenawyer via Hume. This group of eight claims is in Sec. 11, T. 13 S., R. 31 E., near the junction of Copper Creek with the South Fork of Kings River; elevation 6000 feet. Assessment work is maintained.

Bibl.: R. XI, p. 217; XII, p. 66; Bull. No. 50, p. 289.

Painter Mine. Imperial Copper Mining Company, owner. In Sec. 33, T. 11 S., R. 21 E., southeast of Friant. Patented. Several hundred tons of copper ore have been shipped. Idle for years.

Bibl.: Bull. No. 50, p. 278.

Pleasant View (see Apache under Gold).

Uncle Sam Group. W. C. Luce et al., Trimmer, owners. This group of eight unpatented claims, located in 1906, is in Secs. 2 and 3, T. 12 S., R. 29 E., on Crown Creek, opposite Tehipite Dome, and 59 miles east of Piedra on the Santa Fe Railroad. It is in an almost inaccessible position above Tehipite Valley on the Middle Fork of Kings River. Elevation 5500 feet (U. S. G. S.). Development consists of a 30-foot shaft with 8 feet of drift, an adit of 50 feet, and some small surface cuts. The vein is from a few inches to two feet in width and carries azurite, malachite, bornite and magnetite. A large proportion of the mineral claimed by the owner to be bornite proved on examination to be magnetite. The country rock is schist and slate, but near the contact with the granite composing Tehipite Dome. Three men were at work this summer (August, 1914). Abundant hydroelectric power could be developed.*

No doubt this high Sierran mineral belt will be developed some day, but in its present state of lacking transportation, the writer can not see how anything but a high grade free gold proposition could be made to pay, much less a copper mine.

DIATOMACEOUS EARTH (see Infusorial Earth).

FELDSPAR.

J. K. Apperson and C. C. Overstreet, of Trimmer, have three claims located on a deposit of feldspar in Sec. 34, T. 11 S., R. 25 E., 5 miles northeast of Trimmer and 2 miles southwest of the Contact mine. Beryl and topaz are stated to be associated with the feldspar.

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*September, 1915.—Luce reports opening up in the shaft, this summer, a body of high grade ore, and that it is the intention to ship two or three carloads to the smelter before snow closes the trail for the winter. It will be packed, via Dinkey Creek, 35 miles to a spur of the San Joaquin and Eastern Railroad near Shaver. Specimens of this ore shown us, carry mainly bornite and magnetite with some visible free gold.

FULLER'S EARTH.

A number of claims have been located in the Kettleman Hills section, southeast of Coalinga, on deposits reported to be fuller's earth. As far as we could learn, no practical tests of its value as a filtering and decolorizing medium have been made.

The *Walker-Mundy* claims, located by I. H. Patterson, A. D. Ewing et al., of Fresno, are in Sec. 32, T. 21 S., R. 17 E. Material from these claims, on examination in the laboratory of the State Mining Bureau, proved to be a volcanic ash, not particularly fine grained.

At Wahtoke siding on the Piedra branch of the Santa Fe, 5 miles north of Reedley, there is a stratum of white material 5 to 10 feet thick, said to be fuller's earth. It is exposed in a cut, where earth for railroad fills is being taken out with a steam shovel.

GEM MATERIALS.

Beryl and Topaz (see note under Feldspar).

Californite. "Jade mine." Nat Parker and Prothero Bros., Visalia, owners. On the south side of Watt Valley, in Sec. 5, T. 12 S., R. 24 E., located in 1909. The product has been marketed through the Southwest Turquoise Company, 318 West Fourth street, Los Angeles. There is a series of small adjacent veins totaling about 3 feet wide, in serpentine, exposed in several surface cuts and a shallow shaft. So far as developed the material is more or less fractured. The vein strikes southeast and dips northeast, nearly vertical. At present only assessment work is done. There is a white garnet associated with this californite. Because of occasional bright green spots in the mineral, it was thought by some locators to carry nickel, but an analysis made in the laboratory of the State Mining Bureau shows no nickel present.

Bibl.: Bull. 37, p. 94; Bull. 67, p. 125; U. S. G. S., Bull. 262, pp. 72–74; Min. Res. 1902, p. 747; 1911, Pt. 11, p. 1044.

Hyalite has been found at one or two points in the Sierras in Fresno but not exploited.

Tourmaline. Red and green tourmalines are found in quartz on the White Divide, south of Mt. Godard, at an elevation of about 12,000 feet. A few stones from here have been cut for gems. On Spanish Peak, in Sec. 1, T. 12 S., R. 28 E., at an elevation of 9700 feet there is a ledge of white quartz in schist, carrying brown garnets and green tourmaline. The material on account of being somewhat shattered and translucent, is not suitable for gems except occasional small crystals of the tourmaline. A mining location had been at one time filed on this ledge and a small hole blasted out.

Vesuvianite (see Californite).

GOLD.

In the early days and up to as late as 1903 more or less placer mining as well as quartz, was carried on in many of the gulches and canyons in the foothill region of the Sierras in Fresno County. Among these may be mentioned particularly Temperance Flat, Sampson's Flat, Big Dry Creek district, and along the San Joaquin River around old Fort Miller above Friant (formerly Pollasky). Most of the placers, being only superficial, have been worked out. Some of the quartz properties have been abandoned, and others consolidated, so that many of the names listed in the older reports do not now appear.

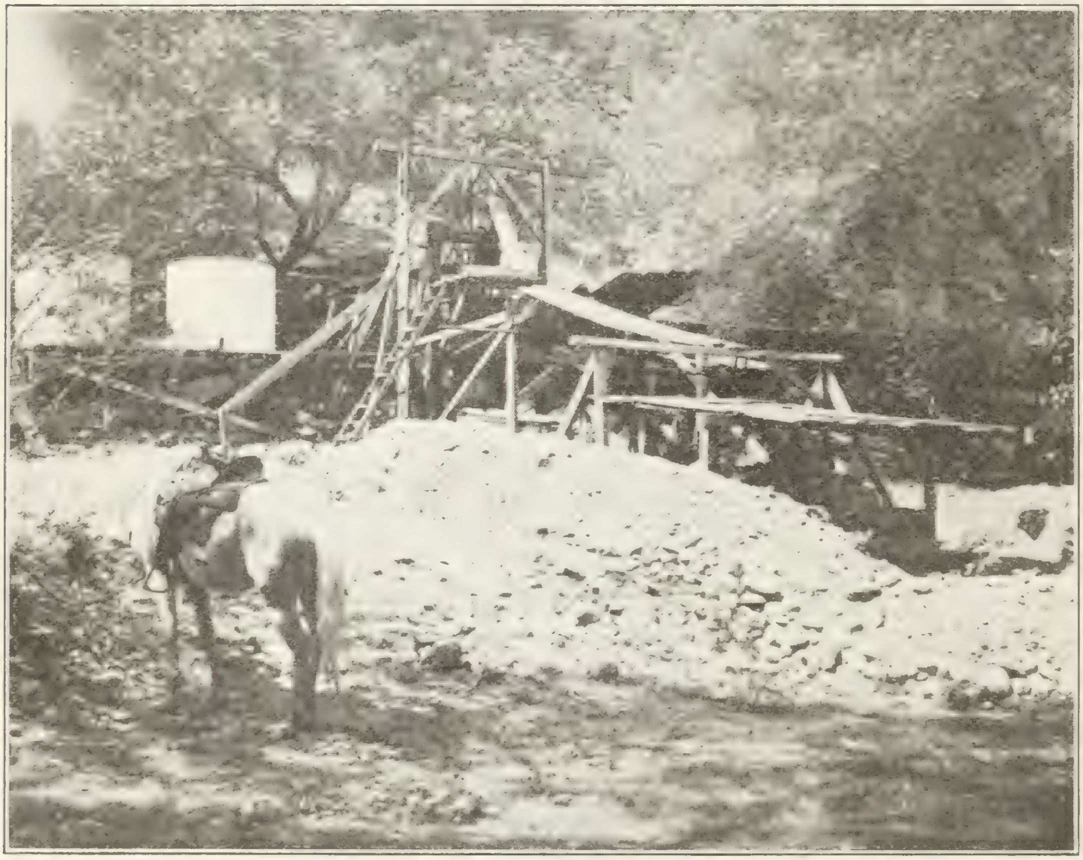


Photo No. 34. Two-stamp mill at Apache Mine, Trimmer, Fresno County.

Alice, Babby and Cloud Claims. William Terrill, Trimmer, owner. On Eagle Peak north of Trimmer. Assessments only.

Apache (formerly Pleasant View). Wm. Terrill, Trimmer, Dr. Powers et al., of Sanger, owners. There are two unpatented claims, on the north bank of the Kings River, in Sec. 20, T. 12 S., R. 24 E., 1 mile south of Trimmer Springs. The ore occurs as an impregnation in mica schist at a contact with serpentine. Granite is near-by on the west of the schist. The ore is principally base (pyrrhotite, chalcopyrite and pyrite), carrying some values in copper besides a little free gold. A working test at the Selby smelter is stated to have yielded

$22.50 per ton, concentrates 10 per cent, assaying $115 per ton. A 700-foot adit had crosscut the ore zone (August 1, 1914) showing a width of 10 feet at a depth of 440 feet. Other developments consist of shallow surface workings. Equipment includes a 2-stamp triple-discharge mill with a 2½-foot by 10-foot plate, and a 6-foot Frue vanner, driven by a 9 horsepower gasoline engine (see photo No. 34). Water is pumped from the Kings River to tanks above the mill. Concentrates will be shipped. Four men at work.

Arkansas, Black Bull and Arrastra Claims. Wm. Terrill et al., Trimmer, owners. On Sycamore Creek, in Sec. 5, T. 12 S., R. 25 E. There are two tunnels aggregating 500 feet. Assessments only.

Bantam Prospect. J. R. Fike, Trimmer, owner. On agricultural patented land, in Sec. 24, T. 12 S., R. 24 E. There is an incline shaft down 65 feet and a drift south 40 feet with a winze 50 feet. The quartz vein between granite walls is from a few inches to 2 feet wide, carrying pyrite, chalcopyrite and marcasite. Values are bunchy, said to average $4 to $5.

Benson (see Little May).

Big Sampson (see Delilah Mining Company).

Black Jack (see Delilah Mining Company).

Boger Gravel (see under Stone Industry).

Brushy Ridge Mining Company. M. Finnegan et al., Dunlap, owners. This group of eight claims is between the M. and M. and the Dixie Queen, about a mile from Dunlap. Elevation 1800 feet (bar.). The present company has had the property since January, 1907. The old shaft, down 30 feet, is said to have yielded a pocket of free gold ore which was treated in an arrastra. There are two short adits. The new incline shaft is down 206 feet, with a crosscut of 50 feet at the 200-foot level, showing the vein 12 feet wide, assaying $1 per ton. Drifting has not yet reached the ore shoot. Country rock is schist. Equipment includes a geared hoist with a 9 horsepower gasoline engine, 6-inch blower and a ''bulldozer'' pump.

Richard Burton and Joe Kesterman are working a placer claim on Laurel Creek in the NW. ¼, Sec. 11, T. 10 S., R. 26 E., 4 miles northeast of the Dinkey Creek Ranger Station.

Cloudburst Mining Co. (quartz), on Home Camp Creek near Cascada (Big Creek P. O.), is maintaining assessments only. J. St. Claire, Preston, Idaho, P. Donovan et al., owners.

Contact Mining and Milling Company (one time known as McDuff and McMurty, also Ira Hawk). J. K. Apperson, president; C. C.

Overstreet, secretary. Post office, Trimmer. There are three unpatented claims on unsurveyed land, about Sec. 23, T. 11 S., R. 25 E., 9 miles by trail from Trimmer, and 22 miles northeast of Piedra. Elevation 2750 feet (bar.) at the mill. The mine was first opened up in 1890 and worked with an arrastra. The present owners have worked it since 1894, incorporating in 1914. The ore occurs in a flat-lying vein in granite (somewhat decomposed) and carries free gold, also galena and pyrite; average value stated to be $21.25 per ton, including a little silver. The sulphide ore occurs principally on the west and south, the oxidized ore being to the north and east and carrying the gold mostly in the ochre along the footwall. The pay shoot varies from 4 inches to 2 feet in width. Being a flat deposit all underground work is on the vein, including a 110-foot adit and two 60-foot drifts. The ground

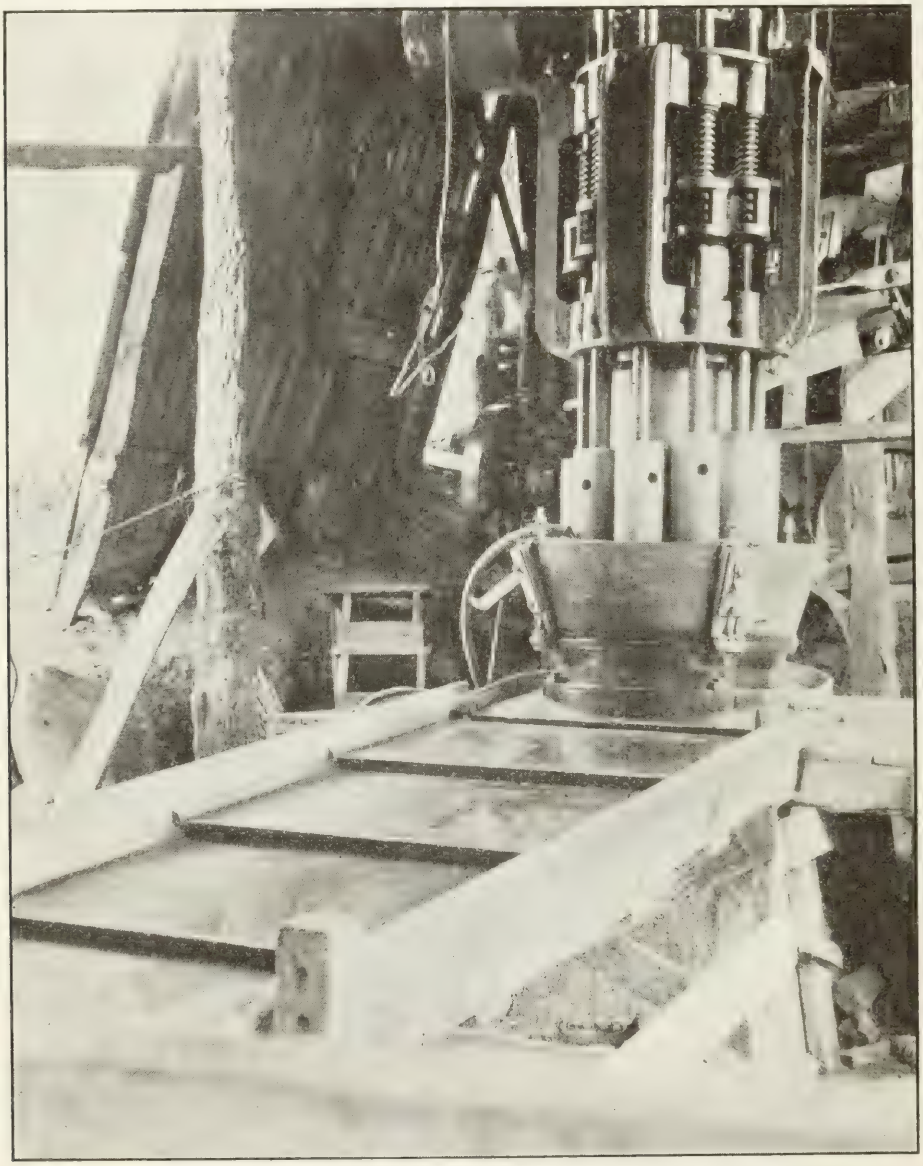


Photo No. 36. Straub patent mill (ten 175-pound stamps) at Contact Mine, Fresno County.

between the latter two will be stoped out, allowing it to cave behind the work. A depth of 50 feet below the surface is reached. The ore is sledded to the mill about ½ mile.

A Straub patent stamp mill is used (see photo No. 36). This has ten 175-pound stamps, operating in a circular mortar, at 115 drops per minute, 5½-inch drop, with a 40-mesh, diagonal slot screen, and amalgamated plates. It is driven by a 6 h.p. distillate engine. The capacity is given at four tons per twenty-four hours. Five men were employed (July, 1914). There is another vein ¼ mile to the south, 3 feet wide, strike east, dip 45° S., said to assay $11.60 gold and 10 cents silver per ton. There is a tunnel in 90 feet. A cross vein carrying no values runs north and south between the two.

Davis Flat Mine (one time called Little Monitor). Davis Flat Mining Company, owner. T. Elliott, president. Office, Selma. It is in Sec. 1, T. 13 S., R. 26 E., on Sampson Creek about 10 miles northeast of Dunlap. The ore is free milling quartz from a series of gash veins. Development work consists of a 75-foot adit, with 60-foot winze, open cuts and some small stopes and short drifts. Between 400 and 500 tons of ore have been milled, mostly from the open cuts, said to have yielded $12 per ton. There is a 5-stamp mill with 1250-pound stamps, but the earlier milling was done with an arrastra. Worked intermittently; idle since 1912 except for assessments.

Bibl.: R. XII, p. 129; XIII, p. 168.

Delilah Mining Company (includes the Big Sampson, Black Jack, Gilkie, and Hercules). W. J. Kyle, president; Earl Covel, secretary. Home office, Coalinga. This group of eight claims is in the NE. ¼, Sec. 14, T. 13 S., R. 26 E., 8 miles north of Dunlap, elevation 4700 feet (bar.). There is a good road from Dunlap to within 1½ miles. It is within the boundaries of the Sequoia National Forest. The timber consists of oak, yellow and sugar pine, and water is obtained from springs. The principal vein as seen on the surface appears to be on the contact between an altered pyroxenite and a schist. Under the microscope the pyroxenite shows considerable secondary pyrite impregnating the phenocrysts as an alteration product. There are several shallow surface cuts, a tunnel in 700 feet and two shafts, 90 and 50 feet, the latter with a 30-foot drift. Some years ago the former owners had a cannon ball mill, also a Huntington. There is a 9″ x 10″ x 12″ Sullivan compressor, steam driven; and a Leyner-Ingersoll water drill is being used. Wood costs $2 per cord, and one cord per day (one shift) is consumed. Five men were at work (August, 1914). The tunnel is being driven to crosscut the vein.

Bibl.: R. VIII, p. 207; XII, pp. 127, 128; XIII, pp. 165, 166, 167, 171.

Dixie Queen Mining Company. John Whitt et al., Visalia, owners. This ground is northwest of the Brushy Ridge group, in Sec. 4, T. 14 S., R. 26 E., near Dunlap. There is no vein but the "ore" is an impregnated schist. Reduction equipment consists of a Dodge crusher, and a California roller mill (Chilian), driven by a 25 h.p. Fairbanks-Morse crude oil engine. There is also a 10″ x 12″ air compressor. Only a limited amount of development work has been done. Idle since May, 1914.

Dodge Placer. John Dodge, owner. This placer mine at Kaiser Creek Diggings, in Sec. 4, T. 7 S., R. 25 E., 12 miles due north of Cascada (Big Creek post office), has been worked in a small way by the owner for several years past. Elevation 5500 feet. (U. S. G. S.)

Eastwood Prospect, on the J. S. Eastwood ranch, in Sec. 30, T. 12 S., R. 25 E., south of Trimmer. J. S. and J. C. Riffe, of Kingriver, own an undivided half interest in the mineral ground. There are three shafts, 93, 45, and 37 feet, respectively. The first one shows the vein 5 feet wide, strike northwest, dip 30° NE. and steeper with depth. The footwall is granite and the hanging-wall schist. The 37-foot shaft shows a 33-inch vein of quartz. No ore has been milled as yet. Assays are stated to show $31.40 gold with a little silver and an occasional trace of copper.

Eliza Jane Mine. Owners, Clark-McClurge Company, 716 Griffith-McKenzie Building, Fresno; A. W. Anderson, secretary. R. W. Watson et al., Fresno, care of San Joaquin Light and Power Company, have a bond on the property. It is in the Hughes Creek District in Sec. 29, T. 12 S., R. 24 E., 4 miles north of Piedra, elevation 1150 feet (bar.) at tunnel. It was first worked about 1889 by V. Moore. The present owners have had it since 1904, having produced about $100,000, working at intervals. The ore body is a fissure vein in a hard schist, the value being mostly in free gold with some galena and pyrite. The vein varies from 16 inches to 3 feet in width, strike about N. 50° W., and dip E. nearly vertical. Adjacent to the vein the wall rock is schistose, but it grades through fine-grained to a coarse-grained gabbro.

There is a total of over 4000 feet of workings and a depth of 280 feet below the outcrop is reached in the winze from the main adit which is in 500 feet on the vein. The winze is down 145 feet and has drifts of 200 feet south at 90 feet; 60 feet south at 130 feet; 30 feet south and 20 feet north at bottom. In the last named the vein is 3 feet wide, said to mill $30. Both overhand and underhand stoping has been done. A width of 5 feet was stoped, averaging $12 per ton milled, the schist assayed $6 per ton. Though idle when visited (July, 1914) the mine was being kept unwatered by the watchman, pumps being driven by compressed air. There is a 50 h.p. motor for the compressor, a 10 h.p. motor for the hoist at the winze, and a 15 h.p. motor for the Huntington mill. There are three 23-ton cyanide leaching tanks for tailings treatment. Power is obtained from the San Joaquin Light and Power Company.

Gilkie (see Delilah Mining Company).

Gilroy Claim. Henry Sullivan, Grabner, owner. This claim is in Sec. 17, T. 10 S., R. 22 E., on Temperance Flat, 3½ miles northwest of Wellbarn Station on the San Joaquin and Eastern Railroad, elevation 1000 feet (U. S. G. S.). It was located in 1896 and only assessment work done until 1913 when a new ore shoot was struck. The country rock is a decomposed granite and the quartz vein carries free gold, galena and pyrite, stated to mill $27 per ton in free gold. The vein averages 10 inches wide and strikes northeast, dipping 48° NW. The adit showing the new shoot is in 92 feet on the vein with a winze down 45 feet from which ore has been stoped for 30 feet along the vein. There is a 70-foot winze in the older workings. The ore was milled at the John L. mine adjoining, which arrangement will continue when work is resumed this fall.

Graveyard and Vulture. Ira F. Hawk, owner. Near Pine Ridge. Assessment only.

Hercules (see Delilah Mining Company).

Independence Group (Collins). Bert Sides and Bert Ashbrook, Kingriver, R. F. D., owners. This group of three parallel claims adjoins the Eliza Jane mine on the southeast, in Sec. 29, T. 12 S., R. 24 E., 4 miles north of Piedra; elevation 1000 feet (bar.). There are three veins, the middle one of which is the extension of the Eliza Jane, and like it, carries free gold, galena and pyrite in quartz. The wall rock is the same hard schist, and the vein is from a few inches to 2 feet in width. There are three adits, 100, 60 and 40 feet, and three shafts, 65, 50 and 45 feet. No stoping has been done as yet, but drifting has yielded a small tonnage of ore of which twelve tons treated in the Eliza Jane mill in February last, gave $25 per ton on the plates. Two men at work.

Robt. Ingelhardt is working a placer claim on Kaiser Creek north of Cascada.

Inyo (see John L.).

Iowa, a placer property on the San Joaquin River about 6 miles above Friant. Idle past eight years. It was worked by ground sluicing, using a turbine wheel and six 6-inch centrifugal pumps.

Jenny Claim, Olof V. Blom et al., Fresno, owners, P. O. Box 1006. It is in NW. ¼, Sec. 16, T. 13 S., R. 27 E., 5 miles northwest of Millwood. The quartz vein carries principally arsenopyrite, with some pyrite and chalcopyrite, said to assay $15 per ton in gold and silver with a little lead and copper. There is one adit of 115 feet; another 206 feet with 45 feet of crosscut at the end, and a shaft of 50 feet. It is proposed to put in a "Blom Patent Roaster and Fume Condenser" (U. S. Pat. No. 1098611) this fall to treat the ore, of which there is a small tonnage on the dump from development work.

John L. Mine (one time called Inyo, also Martin; known locally as the Sullivan). John Sullivan and Mrs. Henry Sullivan, Grabner, owners. This mine, on Temperance Flat, is in the SE. ¼, Sec. 17, T. 10 S., R. 22 E., 3½ miles northwest of Wellbarn Station on the San Joaquin and Eastern, by a fair road. It was located in 1853 and has been worked more or less regularly ever since—particularly the past thirty years, by Henry Sullivan. It is credited with a total output to date of over $75,000.

The vein, which is a fractured quartz, is between a talcose schist footwall and granite hanging and strikes northeast with dip 41° NW. It is proven for a length of 1500 feet on the surface by cuts and shallow shafts. The pay shoot is 12 to 41 inches wide and stated to be 1000 feet long. The old tunnel was in 1000 feet on the vein but is now caved and the new one 105 feet lower is in 600 feet with 200 feet of it on the vein. A raise is being driven to connect with the upper level. Originally an arrastra was used, and more recently a 1-stamp Kendall mill, steam driven. A 2-stamp Hendy mill, 1000-pound stamps, and a Frue vanner are to be installed this fall. Two men were at work (August, 1914).

Bibl.: R. VIII, p. 214; X p. 204; XII, p. 129; XIII, pp. 167, 171.

Kaiser Creek Diggings (see Dodge, also Ingelhardt).

Keeno and Joseph G. W. D. Coats, Fresno, owner. These are two patented claims at Temperance Flat. Idle.

Bibl.: R. XII, p. 129; XIII, pp. 167, 171.

Laurel Creek Mines (see Burton, Richter and Wakefield).

Little May Claim. Lawrence Benson et al., Burrough, owners. It is on Sycamore Creek, near Trimmer. The quartz vein carrying crystallized gold is in schist. There is a shaft down 40 feet and a tunnel in 60 feet.

Little Monitor (see Davis Flat Mining Company).

Low Pocket Mine. Owned by a Mr. Pearson, of Portland, Ore. It is in Sec. 28, T. 12 S., R. 25 E., southeast of Trimmer. It was so named because of a pocket of several thousand dollars having been taken out at the surface a few years ago. Two men were at work on development this summer.

M. and M. Mining Company (formerly White Cross). W. A. Macdonald, president; G. A. Parker, secretary. Office, Dunlap. This company has a bond on the White Cross owned by Reed Bros., Reedley, and has in addition located several other claims on adjoining ground. The group is in Secs. 3 and 10, T. 14 S., R. 26 E., 1 mile southwest of Dunlap. There are two principal veins, the ''White Cross'' and the ''Cross'' which intersect. The former, which carries most of the values, is in schist near a granite contact, the granite being on the footwall side. The gold is mostly free, with some pyrite. On the 300-foot level this vein is stated to show average assays of $26.85 per ton for a length of 100 feet, the ore being 6 to 42 inches wide. On the same level the Cross vein is 4½ to 5½ feet wide and assays about $3 per ton. They have drifted 130 feet on the shoot and 125 feet on the Cross vein. The main adit (upper) is in 600 feet with a 150-foot vertical winze and a 90-foot crosscut at bottom. A new adit has been started to cut the vein 150 below the bottom of the winze. Idle, August, 1914, but work is to be resumed this fall. The former operators packed ore down by burros and sleds to the creek below (one summer about 1894), and put it through a 1-stamp mill, recovering $15,000.

Bibl.: R. VIII, p. 208; XII, p. 131; XIII, p. 170.

Martin (see John L.).

McDuff & McMurty (see Contact M. and M. Company).

Midas Claim. John Anderson, Grabner, and Mrs. E. A. Bonnell, Auberry, owners. This claim is at Temperance Flat, adjoining the Providence on the southwest. Anderson is working alone, drifting. There are two tunnels, 156 and 200 feet. Ten tons of ore recently treated by arrastra at the Providence is stated to have yielded $40 per ton. The pay streak is 8 inches wide in a 6-foot vein in granite.

Oro Fino No. 1 and No. 2. Adjoin Delilah at Sampson Flat. Abandoned.

Bibl.: R. VIII, p. 207; XII, p. 130; XIII, p. 168.

T. G. Price has been working a placer claim for several seasons on Dinkey Creek, 7 miles below Forest Ranger Station, about Sec. 3, T. 11 S., R. 26 E.

Providence Mine. Logan, Beard & Nelson, of Pine Ridge, owners. It is in Sec. 13, T. 10 S., R. 25 E., 2 miles north of west from the Dinkey Creek Station of the U. S. Forest Rangers. There is a 10-stamp mill on the property. Idle several years, except for assessment work.

Bibl.: R. XII, p. 130; XIII, pp. 169, 171.

Providence Claim (formerly Wide Awake). O. F. Sloan and Perry Tyre, Grabner, owners. It is on Temperance Flat, in SE. ¼, Sec. 17, T. 10 S., R. 22 E., 3½ miles northwest of Wellbarn Station on the San Joaquin and Eastern. Elevation 850 feet (U. S. G. S.). It was located in 1908. The vein is an ochreous quartz in decomposed granite. There is a vertical shaft of 50-foot depth, with a 38-foot drift. At 24 feet below the collar of the shaft is an adit in 200 feet. Wire gold shows in the ochre and quartz, the vein being about 8 inches wide. Three men were at work and an arrastra in operation (see photo No. 80). A 12 h.p. distillate engine furnishes power for the arrastra, pump and hoisting.

Photo No. 80. Arrastra and plant at Providence Mine, Temperance Flat, Fresno County.

H. Richter is working a placer claim at Cabin Meadow, in Sec. 14, T. 10 S., R. 26 E., on Laurel Creek, northeast of the Dinkey Creek Forest Ranger Station.

Rico Claim. John Bittern, Trimmer, owner. It is 3 miles north of Eagle Peak, north of Trimmer. The vein is reported to be 80 feet wide, with 20 feet of free milling ore assaying $10.50. There are three adits, 20, 40 and 60 feet. The footwall is stated to be serpentine and the hanging, slate.

Rosa Claim. T. S. and H. Schell and E. Bailey, owners, Hughes Creek via Sanger. It is in Sec. 18, T. 12 S., R. 24 E., 6 miles north of Piedra. The claim has been located and relocated several times in the past thirty years, and by the present owners in 1912. It is stated there are two veins at a contact between granite and schist. There are two adits, each in about 100 feet, one being a drift. The crosscut has not yet cut the vein. Assessment work only.

San Joaquin Claim. W. G. Walker, J. B. Baker and Dr. C. H. Power, owners; home office, Friant. It is located at Temperance Flat, in Sec. 17, T. 10 S., R. 22 E., 4 miles northwest of Wellbarn Station on the San Joaquin and Eastern railroad. Elevation 1350 feet (U. S. G. S.). This claim has been worked at intervals for some years, and by the present owners since April, 1914. The quartz vein is in decomposed granite, carrying free gold with some sulphides; strike northeast and dip 20° to 30° NW. The gold is stated to assay $14 per ounce. There is an incline down 100 feet on the vein and an adit below in 40 feet. A raise is being driven to connect the two. A 6 h.p. distillate engine runs the arrastra, which treats 2 tons of ore per twenty-four hours. Distillate costs approximately 14 cents per gallon at the mine, 4 cents of which represents the freight from Wellbarn Station to the mine. Two men were at work.

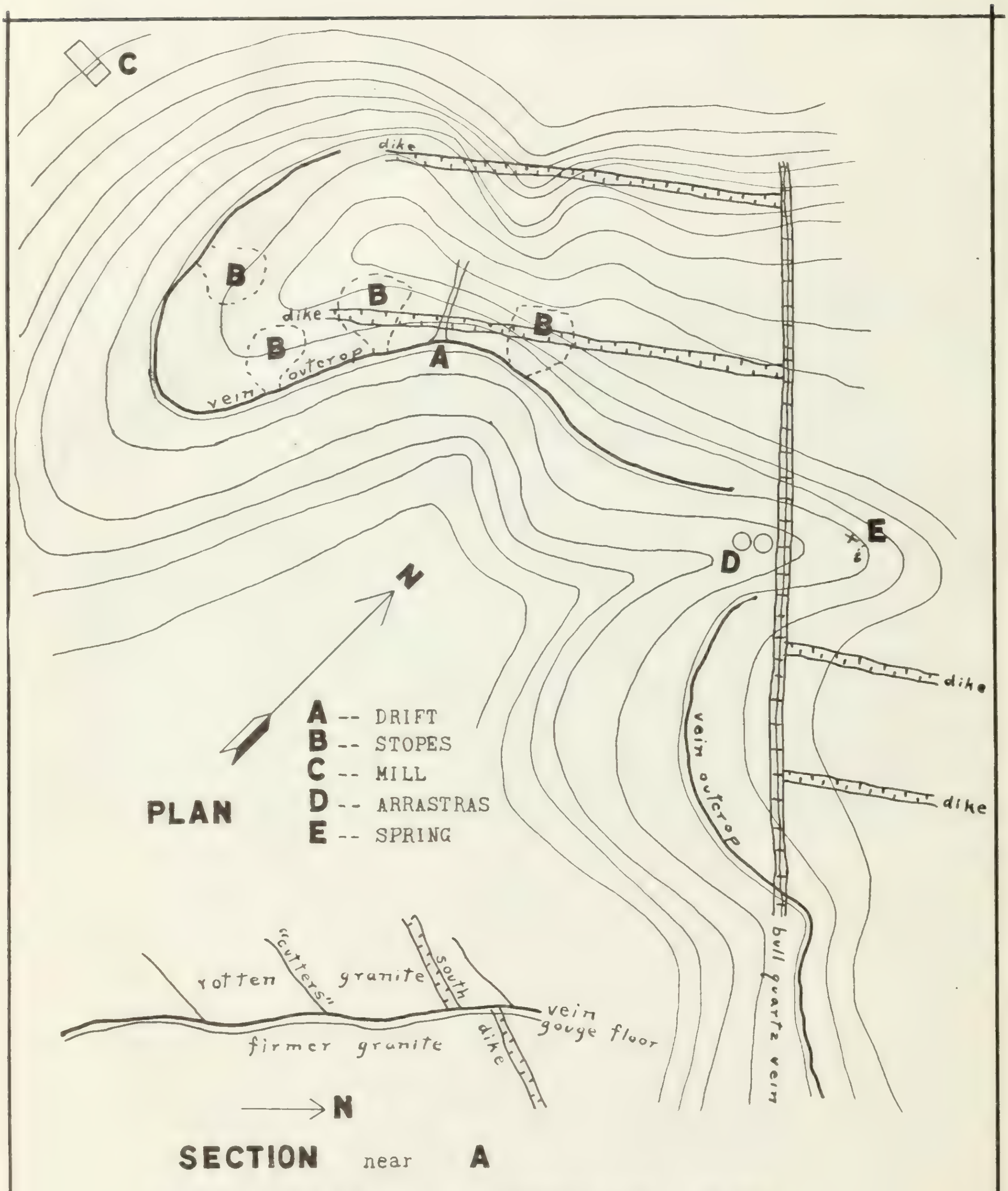
San Joaquin Rock and Gravel Co. (See under Stone Industry.)

John Ship and *Mr. Ward* have a quartz claim at Sample Meadow, about Sec. 18, T. 7 S., R. 26 E., north of Cascada (Big Creek post office). Assessments only.

Sullivan (see John L.).

Sunnyside Group. Sunnyside Gold Mining Company, owner; Edgar Van Meter, president; G. G. Parsons, secretary; L. B. Chenoweth, superintendent; office, Land Company Building, Fresno. This group is in the old "Sycamore District," now locally called Hughes Creek. It is located in Sec. 21, T. 12 S., R. 24 E., 18 miles northeast of Sanger and 5 miles north from Piedra Station of the Santa Fe Railroad. Elevation 1250 feet (bar.) at the mill, the mine workings being 250 feet higher. There are ten unpatented claims, first located over thirty years ago, but not much work done until 1903. All the gulches below have been placered.

The vein is flat, with occasional rolls and troughs and a slight dip to the south (see sketch map). The country rock is granite, the hanging-wall being softer and more decomposed than the footwall. There is an impervious clay gouge on the floor, which apparently prevented the waters, circulating along the fissure, from going into the granite below. The vein is from a few inches to 2 feet in width, and the gold is principally free, with some pyrite. High values are occasionally found in ochreous bunches. In the northern part of the area shown in the sketch map, outside of the vein as indicated, no gouge or mineralization has been found. The vein does not come to the surface on the north side of the hill. The dikes are aplite, and dip steeply to the north, the south one being displaced by the vein. Both



SKETCH MAP of SUNNYSIDE MINE
FRESNO CO.

dikes are faulted by a heavy vein of bull quartz, which strikes northwesterly. The drift at "A" is being driven to crosscut the north dike and ascertain if the flat vein stops altogether or dips to the northwest and goes down steeper.

In the decomposed granite, which is partly granular in places, they use a 1¼-inch auger with ratchet and pressure drill. From 35 to 50 feet of holes per man per shift are drilled, and a special low Hercules 15 per cent powder is employed. In stoping, the ground is allowed to cave behind the work. The milling equipment includes a 2-stamp Krogh mill, with amalgamated plate 4 feet by 10 feet. Power is furnished by a gasoline engine. Six men were at work in July. The mine is credited with a total production to date of approximately $40,000, of which $17,000 was taken out from a single pocket and reduced in the arrastras.

Temperance Claim. Mrs. W. A. Field, Oakland, owner. This is a patented claim at Temperance Flat, northwest of Wellbarn. Idle.

Bibl.: R. XII, p. 131; XIII, p. 170.

Vulture (see Graveyard).

William Wakefield is working a small placer property in Sec. 13, T. 10 S., R. 26 E., on a branch of Laurel Creek, 4 miles due east from the Dinkey Creek Forest Ranger Station. Elevation 7000 feet (U. S. G. S.).

White Cross (see M. and M. Mining Company).

Wide Awake (see Providence, Temperance Flat).

GRAPHITE.

On the *E. D. Kean* ranch, in Sec. 12, T. 14 S., R. 24 E., 4 miles east of Squaw Valley post office, there is a deposit of graphitic schist. It has more or less quartz with it and is too impure to be of commercial value. There is also a similar occurrence on the Ruth ranch farther east.

A 15-inch vein of graphite is reported on Sycamore Creek near Trimmer, but we have not seen any samples of the material.

Bibl.: R. XIII, p. 642; Bull. 38, p. 280.

GYPSUM.

Gypsum is a hydrous calcium sulphate. Its color ranges through white, gray, yellow and red to darker shades, according to purity; and it is found massive, granular, fibrous and crystalline. Calcium sulphate occurring without water of crystallization is the mineral anhydrite. The uses of gypsum are many and varied. Calcined, it is used as plaster of paris, and replaces lime for hardwall plasters. It is used as a retarder in the manufacture of Portland cement and in the preparation of fertilizers. It is also utilized in the paper, glass, dyeing and other industries. As a fertilizer, it is stated to be valuable in reclaiming "black alkali" land.

Coalinga Deposits. There are two deposits near Coalinga, one about 9 miles to the north and the other at the old San Joaquin Valley coal mine in Sec. 26, T. 20 S., R. 14 E. At one time a considerable tonnage of gypsum was shipped from both these properties, but they have now been idle several years.

Bibl.: R. XII, p. 323; XIII, p. 503; Bull. 3, p. 63; Bull. 38, p. 283.

Paoli Mine. A. P. Sheppard, C. S. Pierce et al., Fresno, owners. This deposit is on patented ground in Sec. 13, T. 15 S., R. 12 E., about 18 miles southwest of Mendota on the Southern Pacific. It was worked for a number of years and a considerable tonnage of gypsum shipped ground, for fertilizer purposes. On account of the expensive haul to the railroad the property has been idle the past four years.

Bibl.: R. XII, p. 323; XIII, p. 503; Bull. 3, p. 63; Bull. 38, p. 283.

Paul Schuck, of Fresno, has a deposit of gypsum on the west edge of T. 14 S., R. 12 E., from which shipments were being made via Firebaugh on the Southern Pacific, up to the end of 1913. Idle in 1914.

INFUSORIAL EARTH.

A. P. Sheppard, of Fresno, has a deposit of infusorial earth of good quality in T. 15 S., R. 12 E., southwest of Mendota.

LIME AND LIMESTONE.

Limestone occurs in T. 12 S., R. 26, 27 and 29 E., east of Trimmer, on the north side of the Kings River, also at Sampson's Flat, south of the river and north of Dunlap. Owing to their distance from a railroad these deposits are undeveloped.

Lime was at one time burned in a shaft kiln about $\frac{1}{3}$ of a mile south of Dunlap and near the White Cross mine, but none has been produced for several years past.

Bibl.: R. VIII, p. 208; X, p. 185; XIII, p. 628; Bull. 38, p. 328.

MAGNESITE.

Magnesite is magnesium carbonate, $MgCO_3$, color snow-white to brown, hardness 3.5 to 4.5, sp. gr. 3.0 to 3.12. It is of frequent occurrence in the serpentine areas of California, particularly in the Coast Range, but also in the Sierran section, where the deposits in Fresno and Tulare counties are found.

The industrial uses for magnesite are many and varied, and the demand will no doubt increase materially in the next few years, particularly now that the Panama Canal gives the California product a cheaper entry into the eastern markets. For most purposes magnesite is calcined before using. The largest tonnage at the present time is used in the manufacture of bricks for the lining of basic Bessemer converters, both in steel and copper smelters. It is also employed in copper reverberatories, and other special metallurgical furnaces, such as for handling bullion, silver slimes, electric smelting, heating, welding and melting furnaces, calcium carbide kilns, and in the burning zone of rotary kilns in Portland cement plants.

Not as high a purity of material is necessary in furnace liners, particularly for steel, as in some other uses, for in the case of basic open hearth steel furnaces, while the magnesite must be free (or at least very low) from silica, it can carry a noticeable percentage of iron oxide or serpentine without impairing its efficiency. In fact, by some it is considered an advantage, as such impurities permit the sintering of brick at a lower temperature than is possible with pure magnesite. "Dead-burned" magnesite—that from which all the CO_2 has been expelled—is hard to handle, having little or no plasticity. Its plasticity is said to be improved by adding partly calcined or caustic magnesite.

Another extensive and expanding field for the employment of magnesite is in the manufacture of artificial stone, flooring, tiles, wainscoting, etc. These products are put on the market under various trade names, among which may be mentioned: idealite, marbeloid, monolith, karbolith, chemolith, etc. The magnesite floors being put in Pullman and other steel railroad coaches are of such products. The reaction made use of is that a moistened mixture of MgO and $MgCl_2$ will form a strong cement (known as oxychloride or Sorel cement). There should be an absence of lime, as calcium chloride is hygroscopic and on hydrating swells, destroying the usefulness of the material. Soluble silicates of the nature of "water glass" are also used with the magnesia. A similar magnesia cement is used as a paint, but of course applied thin with a brush. "Porcelith" and "Liquid Stone" are two brands prepared by San Francisco firms from California magnesite. For use on wood, where it acts as a fire retardant, it may be mixed still thinner and sprayed on.

In the "sulphite" process of paper manufacture, calcined magnesite is used as a carrier of SO_2 gas in the digester. The uses of the carbonic acid gas derived from calcining magnesite are well known, carbonating beverages, refrigeration, etc. For these purposes it is liquefied by compression, to facilitate its transportation. At the present time, however, as lime rock is obtained more cheaply and the calcined residue is more readily marketed, no magnesite is being used on the Pacific Coast for the manufacture of CO_2. There are many other uses which will not be detailed here.

Production of magnesite in Fresno County began in 1904, with 38 tons reported, and the total recorded yield of the county to the end of 1913 has been 5643 tons, valued at $62,295 for the crude material at the mines.

Bibl.: Bull. 38, p. 327; Bull. 67, pp. 92, 93; U. S. G. S., Bull. 355 and 540, "CEMENTS, LIMES AND PLASTERS," E. C. Eckel, 1905, pp. 149–167.

Photo No. 33. Plant of Fresno Magnesite Company, Piedra, Fresno County.

Fresno Magnesite Company (one time locally called Bachler). M. F. Tarpey, president; A. B. Tarpey, secretary; office, Tarpey post office. This group of forty unpatented claims is principally in Sec. 5, T. 13 S., R. 24 E., ½ mile north of Piedra and on the opposite side of the river. Piedra is the terminus of the Santa Fe's Reedley-Piedra branch line. It was first worked in 1905, and most of the output to date from Fresno County has come from this property. The shipping point was formerly Sanger, a 15-mile haul, but since Hess' report* the Santa Fe branch above mentioned has been built and also an excellent steel bridge crossing the Kings River below the mine. The entire product has been shipped to the Hawley Pulp and Paper Company at Oregon City, Oregon. The haul from mine to rail costs 60¢ per ton, and a car per day can be loaded with one 4-horse team.

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*U. S. G. S., Bull. 355, p. 51.

The magnesite occurs in a series of fissure veins in serpentine and metamorphic ferro-magnesian rocks. The main vein, which is 8 to 10 feet wide, strike W. of N., dip E. 50°, is developed by adits and has been worked by stoping. On the footwall it is more or less mixed with waste. The equipment includes a shaft furnace (see photo No. 33), fired by crude oil, with a capacity of approximately 25 tons per day. When operated, twenty men are employed. There was only a watchman on the property when visited (July, 1914).

Bibl.: Reports X, p. 185; XIII, p. 505; Bull. 38, p. 328; Bull. 67, p. 93; U. S. G. S., Bull. 355, pp. 50, 51.

Magnesite boulders have been noted in the "Big Blue" beds in the eastern foothills of the Diablo Range, between Cantua and Salt creeks, about 18 miles west of north from Coalinga. "They are not believed to represent an accumulation in any commercial quantity, but are mentioned only because they point to the presence of magnesite in the serpentine area on the west and prove that at least some of the magnesite veins originated in or prior to the early Miocene."*

L. F. Ward of Hopkins and Fourteenth avenue, Oakland, has a group of claims on a magnesite vein south of Kings River at Piedra, opposite to the mine of the Fresno Magnesite Company, and about ¾ of a mile distant south. The vein, about 8 feet wide, has an east-west strike and is developed principally by a series of shallow surface cuts, also a short tunnel. It is favorably situated for building a gravity tramway to land its product at the tracks of the Santa Fe a short distance below it. The magnesite appears to be of good quality.

Bibl.: U. S. G. S., Bull. 355, pp. 50, 51.

MARBLE

Ellison Bros., of Fresno, have claims located on a marble deposit on Big Creek, near that of the San Joaquin Marble Company, described below.

San Joaquin Marble Company, Emery Wishon et al., Fresno, owners. These claims, covering 125 acres, are in Sec. 36, T. 8 S., R. 24 E., on the south side of Big Creek, 5 miles below Cascada, the terminus of the San Joaquin and Eastern Railroad. Elevation 4000 feet (U. S. G. S.) The marble is only 2000 to 3000 feet from the railroad track, and 500 feet lower in elevation. There is ample electric power at hand, as the deposit is between the two power plants of the Pacific Light and Power Company, whose main transmission line passes near-by. Only minor development work has been done as yet, but marble of good quality and the following colors is disclosed: white, blue, variegated and black. It occurs as a lens in a granite country and runs northwesterly, crossing Big Creek. Its limits were not fully determined, but it appears to be at least 200 feet wide by ½ mile long.

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*U. S. G. S., Bull. 540, p. 509.

MINERAL WATER.

While not generally known as a mineral springs county, Fresno has several groups of springs, both hot and cold. They are found both in the Coast Range at the western end, and in the Sierra Nevada Mountains as well.

Balsam Grove Springs. This group in Sec. 32, T. 8 S., R. 25 E., is in the Sierra National Forest, and the operators, W. H. Thrower and Louis S. Budo, have a 10-year lease from the Forest Service for resort privileges. The post office is Big Creek. The hotel is ¼ of a mile from Carlson Station on the San Joaquin and Eastern, at an elevation of 4500 feet (U. S. G. S.). It is in a picturesque and well timbered country, there being an abundance of pine, fir, cedar and oak. There are three ''iron'' and one ''white sulphur'' springs, all cold. No water is bottled. The hotel and housekeeping tents will accommodate 120 people. This season, 1914, which was their first, having been a successful one, the lessees propose to enlarge their facilities for 1915.

Blaney Meadows Hot Springs are at the upper end of Blaney Meadows on the South Fork of the San Joaquin River, in Sec. 14, T. 8 S., R. 28 E., elevation 7600 feet (U. S. G. S.). There are four small springs with a maximum temperature of 110° F. and a total flow of about 40 gallons per minute. Analysis by the United States Geological Survey shows the total solids to be 780 parts per million, principally sodium chloride. The springs are not utilized except by occasional camping parties.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 54.

There is a carbonated spring at the eastern end of Fish Valley, 11 miles by trail southward from Soda Spring Flat. It is at the corner of the four townships, 4 and 5 S., Rs. 26 and 27 E.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 239.

Collins Spring (see Millerton).

Fresno Hot Springs. Kreyenhagen Estate, Coalinga, owner. Emil and Chas. Kreyenhagen, executors. These, the oldest commercially utilized mineral springs in Fresno County, are in Sec. 34, T. 20 S., R. 13 E., 12 miles due west from Coalinga and 18 miles by road. They are on a hillside about 100 feet above the creek in Hot Springs Canyon. There are five springs, sulphuretted, with temperatures from 88° to

97° F. A bathhouse and hotel were built some years ago at a cost of $11,000, and the property was leased as a resort up to 1914. It has been idle this year, owing to the heavy rains of last winter having washed out a considerable portion of the road up the canyon.

Bibl.: R. X, p. 189; XII, p. 333; XIII, p. 510; U. S. G. S., Bull. 32, p. 204; Water Sup. Pap. 338, p. 78; "MINERAL SPRINGS AND HEALTH RESORTS OF CAL.," WINSLOW ANDERSON, 1890, p. 135.

Lower Mineral Hot Springs. James E. Hughes, 630 Mandana boulevard, Oakland, has a lease from the U. S. Forest Service on the meadow containing this group of springs. They are on the South Fork of San Joaquin River, in Sec. 15, T. 7 S., R. 27 E., about 10 miles below the Blaney Meadow hot springs. They are reached by trail from Cascada and from Shaver, and are used privately and also by occasional camping parties. There are six springs, the hottest showing a temperature of 112° F.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 55.

Mercey Hot Springs. Mercey Mineral Springs Company, owner. F. J. Bourn, president; M. Nuckolls, secretary. Office, Humboldt Bank Building, San Francisco. W. Y. Bourn, manager at the springs. These springs are on Little Panoche Creek, in Sec. 15, T. 14 S., R. 10 E., 25 miles southwest of South Dos Palos, and 30 miles from Los Baños, which is their post office. Elevation 1200 feet (U. S. G. S.). They are located among the barren hills bordering the western edge of the San Joaquin Valley, and for many years were used to supply sheep watering troughs. There has been a resort there for about fifteen years, and the present company has had it since March, 1913. It is equipped with a small hotel and a number of tents, accommodating in all about sixty people. It is intended to improve the facilities in the near future. The main spring has been excavated, forming a reservoir about 15 feet square, which is lined with concrete. In the pool the water has a temperature of 111° F., while at the bathhouse some 250 feet distant the temperature is 108°. The principal constituent is sodium chloride, the water being slightly sulphuretted and there is a little excess gas at the spring. The water was at one time bottled for sale but not at present. The resort is open throughout the year and an automobile carries guests between Los Baños and the springs.

Bibl.: R. XIII, p. 510; U. S. G. S., Water Sup. Pap. 338, p. 78.

Millerton Spring (locally known as Collins). J. D., A. S. and W. G. Collins and J. Musick, owners. It is in Sec. 4, T. 11 S., R. 21 E., on the San Joaquin River, 2 miles northeast of Friant. Elevation 350 feet. (U. S. G. S.) There is one sulphur water spring issuing from a crevice in the granite bedrock near the river's edge. It has been known since the placer mining days of 1856, old Fort Miller and Millerton having been less than a mile east of here, but the spring has been used for resort purposes only since 1907. The temperature is 71° F.; the flow 17,000 gallons per twenty-four hours; and there is a little excess sulphuretted hydrogen gas. The spring is walled in by a cement curb and the water pumped to a cement tank, then heated for bathhouse use. Analysis shows 682 parts per million total solids, principally sodium and calcium chlorides, with 5.2 cc. H_2S per liter. Accommodations include eighteen tent cottages and a twenty-room hotel.

"Sulphur Baths." Santa Rosa Oil and Development Company, owner. Charles L. Smith, president; R. Whitehead, managing director. Office, 205 First National Bank, Oakland. This well, which is in Sec. 12, T. 21 S., R. 14 E., 3 miles southwest of Coalinga, was drilled in 1906 for oil but obtained an artesian flow of sulphur water. The following figures are from the log of the well:

1352 to 1360 feet, dark running sand;
1409 to 1421 feet, sand and shale (good oil);
1435 to 1439 feet, sand showing oil;
1440 to 1445 feet, sand and shale carrying oil;
1570 to 1585 feet, good oil sand;
1600 to 1630 feet, oil sand;
2057 to 2077 feet, white shell;
At 2077 feet, flowing sulphur water.

The flow was originally 6000 barrels per day, but at present it is only 1800 barrels per day.

The temperature of the water is 118° F. as it issues from the well, and it is accompanied by an inflammable gas which is utilized for illuminating purposes about the grounds. The water discharges into a cement-lined tank 75 feet long by 59 feet wide by 10 feet deep, which serves both as a reservoir head for the service pipes and as a swimming pool. There are twenty dressing rooms ranged around three sides of the pool, part of which is roofed over. The water is piped to Coalinga and parts of the oil fields for boiler purposes. It does not scale in the boilers as does most of the other waters obtainable in this region. The cost of operating is only nominal and the company has been paying dividends regularly, being in this respect more fortunate than many of the "oil" companies.

The following is an analysis of the water from this well, made by Smith, Emery & Company, San Francisco, for the Producers' Transportation Company:

Feed Water Analysis.

Analysis of solids	Grains per U. S. gallon	Incrusting solids	Grains per U. S. gallon
Suspended matter Silica (SiO_2)	.76	Suspended matter Silica	.76
Iron oxide and alumina (R_2O_3)	Nil	Iron oxide and alumina	Nil
Lime (CaO)	2.61	Calcium carbonate	4.49
Magnesia (MgO)	1.47	Calcium sulphate	.23
Soda (Na_2O)	29.55	Calcium chloride (corrosive)	Nil
Sulphuric anhydride (SO_3)	.81	Magnesium carbonate	2.75
Chlorine (Cl)	2.33	Magnesium chloride (corrosive)	Nil
Carbon dioxide (combined CO_2)	22.72		
Volatile and organic matter	9.35	Total	8.23
Total solids	69.60	Non-incrusting solids:	
Alkaline	Yes	Sodium carbonate	46.52
Acid	----------	Magnesium sulphate*	.45
Hydrogen sulphide (H_2S)	----------	Sodium sulphate	.68
		Sodium chloride	3.85
		Volatile and organic matter	9.35
		Total	60.85

*Note.—Magnesium sulphate forms some scale in presence of calcium carbonate and sodium carbonate.

There is a *sulphur spring* in Sulphur Meadows, ½ mile south of the Shaver lumber mills, in Sec. 19, T. 9 S., R. 25 E. It is utilized only locally.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 286.

Three Springs, while not "mineral," are yet worthy of mention. They are in Sec. 20, T. 11 S., R. 28 E., on a ridge between the north and main forks of Rancheria Creek, and beside the trail from the Dinkey Creek Ranger Station to Tehipite at the point where the Statum Meadow trail branches off. As the name indicates, there are three, large perennial springs within a short distance of each other, having a fine flow of clear cold water. They are used as a wayside camping spot by parties traveling through that part of the Sierras.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 338.

Trimmer Springs. Trimmer Estate, owner; Morris Trimmer, Kingsburg, president; Wm. Terrill, renter. This group is in Sec. 18, T. 12 S., R. 25 E., on the Kings River, 14 miles northeast of Piedra, and ¾ of a mile south of Trimmer post office. It was formerly operated as a resort, but not since 1911. There are four springs yielding iron, magnesia, and sulphur water. All are cold. They are in a picturesque region.

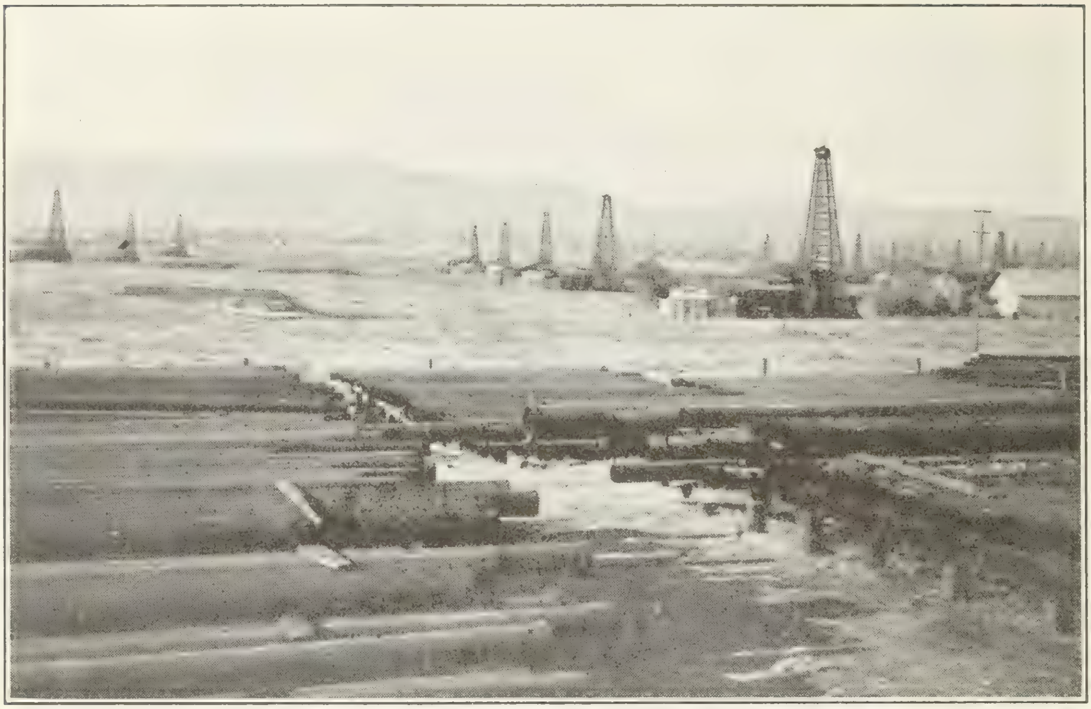

Photo No. 113. Coalinga Oil Field, Fresno County, California, looking north from Associated Oil Company on Section 36.

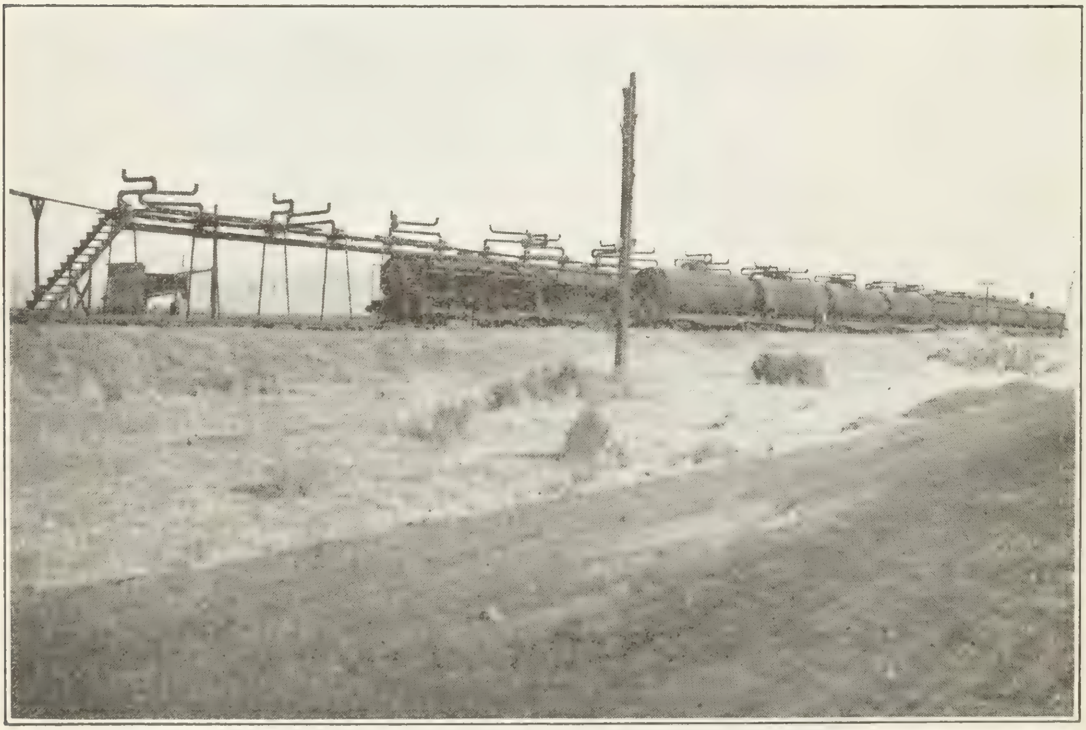

Photo No. 114. Oil loading rack, Crump Siding near Coalinga, Fresno County.

NATURAL GAS.

There is more or less natural gas in nearly all of the oil wells of the Coalinga field. At some it is not utilized at all, while at others it is collected in gasometers and used for lighting, for fuel under boilers and in operating gas engines. The Turner Oil Company manufactures gasoline by compression from the gas of its wells at Coalinga. An inflammable gas has also been obtained in drilling for water northeast of Mendota.

Bibl.: R. VII, p. 65; X, p. 189; XI, p. 210; XII, p. 348; XIII, p. 567; Bull. 3, p. 20; Bull. 19, p. 183; Bull. 69; U. S. BUREAU OF MINES, Bull. No. 19.

NICKEL.

Nickel has been reported from Fresno County, but an analysis made in the laboratory of the State Mining Bureau on a sample of the supposed ore showed it to be californite, a green variety of vesuvianite.

PETROLEUM.

The Coalinga field is the only producing oil district in Fresno County. Of the total recorded mineral product of $66,294,637 for the county to the end of 1913, the sum of $62,130,959, or 94 per cent, represents the value of petroleum yielded. Oil production began in 1890 but was of small amount until 1896. For a time Fresno was the premier county of the State in petroleum output, and it now takes second place only to Kern, both in point of annual yield and of total amount to date.

The Coalinga district is approximately 50 miles long (north and south) by 15 miles wide, covering some 700 square miles on the western edge of the San Joaquin Valley and the eastern foothills of the Diablo Range. A detailed description of the district will not be entered into here as it has recently been covered very thoroughly by R. P. McLaughlin and C. A. Waring of the State Mining Bureau in Bulletin No. 69, "Petroleum Industry of California" (*q. v.*).

During 1913 there were 147 operating companies in the Coalinga field, with 1136 completed wells, of which 915 were producing, in an area of 22 square miles of proved oil land. The yield for 1913 was 18,956,965 barrels, valued at $7,927,736 at the wells.

Bibl.: R. VII, p. 65; X, p. 189; XII, p. 352; XIII, p. 571; Bull. No. 3, 15, 19, 31, 32, 69; U. S. G. S., Bull. 398. A more extended bibliography on petroleum in Fresno County is given in Bull. No. 69 of the State Mining Bureau.

PUMICE (see under Volcanic Ash).

QUICKSILVER.

Arambide and Aurecoechea Claims (see Pacific Quicksilver Company).

Archer Mine. Joe Byles, Coalinga, owner. This claim, located in 1904, is in Secs. 2 and 3, T. 18 S., R. 13 E., 24 miles northwest of Coalinga, and near the Mexican mine. A small amount of quicksilver has been produced, using a retort consisting of six 9-inch pipes. It is stated that the ore retorted yielded 10 to 20 per cent metal, but that there is considerable low grade material in sight. The ore carries cinnabar and pyrite. The country rocks are serpentine and slate. There are five tunnels ranging from 20 to 150 feet in length, and several open cuts. But little more than assessment work is maintained.

Photo No. 105. Furnace at Pacific Quicksilver Mine, Fresno County.

Mercy Group. Mercy Bros., Llanada post office, owners. This group of three claims adjoins those of the Pacific Quicksilver Company on the northwest. Located about 1904. Development consists of several short adits. Assessment only.

Mexican Mine. Antonio Urrutia et al., Panoche, owners. This group of three claims in Sec. 22, T. 18 S., R. 13 E., northwest of Coalinga, was originally located in the sixties. Development work consists of several adits and some surface cuts. The vein is in sandstone and

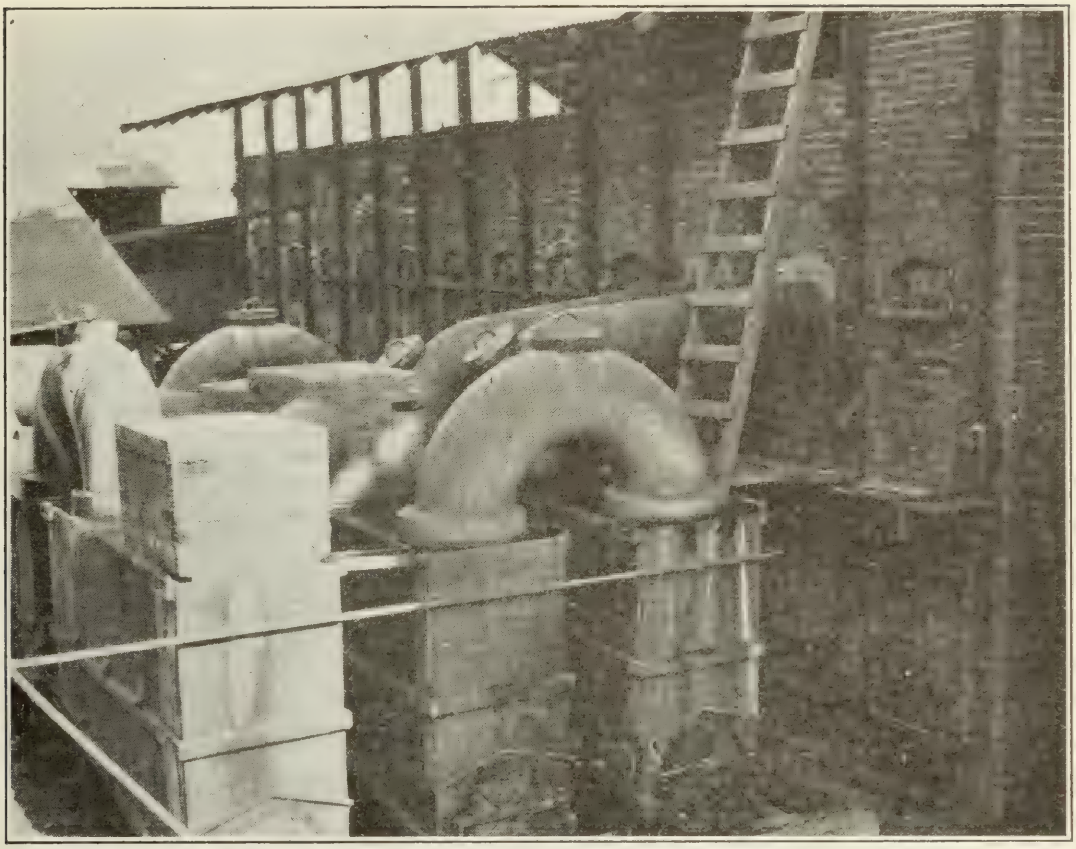

Photo No. 106. Condensers at Pacific Quicksilver Mine, Fresno County.

Photo No. 107. Drawing off burned ore, Pacific Quicksilver Mine, Fresno County.

carries cinnabar associated with silica and oxides of iron, the oxidation product of iron sulphides. Only assessment work has been done of recent years.

Bibl.: Bull. 27, pp. 119, 120.

Pacific Quicksilver Company (includes properties formerly known under names of Providential, Arambide and Aurecoechea, Mercy, Croxon.) E. Augustus Waldron, president; Alfred C. Eaton, secretary. Office, Elks' Building, San Jose. This group includes eighteen claims and five mill sites on a branch of Little Panoche Creek, in Secs. 32 and 33, T. 13 S., R. 10 E., and Sec. 5, T. 14 S., R. 10 E., 25 miles southwest of South Dos Palos on the Southern Pacific Railroad. Elevation 1600 to 2000 feet (U. S. G. S.). The present company has had the property since 1911. The country rock is principally a metamorphic sandstone, and the ore occurs in a series of leached zones with quartz and ochre. Relatively little cinnabar can be seen except on panning, when the ochreous material is observed to yield a good percentage of concentrate. There is a little pyrite with the cinnabar.

Formerly the principal work was done on the Providential and Gabilan claims, but when visited (September, 1914), the ore supply was being drawn from the Arambide from a new shoot uncovered last spring. Here the values occur in a series of small veins and stringers over a width of 24 feet, striking east of south and dipping about 60° E. On this claim there is a 100-foot shaft and 400 feet of adits; and on the Aurecoechea 3000 feet of work, including a 150-foot shaft.

The reduction equipment includes a 24-ton Scott fine ore furnace (see photo No. 105), and two "D" retorts with a capacity of 300 pounds each. They are oil fired. Crude oil costs 88 cents to \$1.10 per barrel delivered at South Dos Palos, plus \$1.17 per barrel freight to the mine. The furnace is 4 tiles long, 50 tiles high, with a 4-inch spacing. The condensers consist of 14 brick chambers and 6 Knox-Osborne cast-iron chambers, the latter being connected in between No. 2 and No. 3 of the brick series (see photo No. 106). From the mine the ore is hauled about $\frac{1}{4}$ mile in a bottom dump wagon onto an ore bin, from which it is trammed to the jaw crusher (run by a small steam engine), then trammed to the furnace. The burned ore is drawn off into a side-tipping steel car (see photo No. 107) and trammed to the dump. There were seventeen men employed.

Bibl.: Bull. No. 27, pp. 119, 121; U. S. G. S., Mon. XIII, p. 380; Min. Res., 1912, Pt. I, p. 939; 1913, Pt. I, p. 204.

Providential (see Pacific Quicksilver Company).

STONE INDUSTRY.

Under this heading for the purpose of simplifying the statistical reports, the State Mining Bureau now classifies the following closely allied branches of the mineral industry: granite, paving blocks, macadam, concrete, rubble and crushed rock of all kinds, sand and gravel. In the earlier reports these materials were handled separately, but from the standpoint of the producer there is so much overlapping that it has been found more satisfactory to group them.

Academy Granite Company. J. S. Williams, San Jose, president; F. M. Blanchard, Fresno, manager. Office, 215 Griffith-McKenzie Building, Fresno. Quarry address, Academy post office. This quarry is in Sec. 13, T. 12 S., R. 22 E., 11 miles northeast of Clovis, on the Southern Pacific Railroad, and was opened up in 1903. The stone, as determined by a microscopic examination of a thin section, is a dark, hornblende diorite, but locally called "black granite." The color permits of a fine contrast of polished and unpolished surfaces, which makes it excellent for monumental and decorative purposes. It is medium grained, and is harder than the lighter granites such as the Raymond granite in Madera County. This makes it more expensive to cut.

So far as uncovered, the stone occurs in large, rounded boulders of disintegration, the quarry cut being as yet shallow (see photo No. 82). The stone at the eastern edge of the property is darker than that on the west. Pneumatic tools are used, power being furnished by distillate engines. The dressing and polishing is done in the sheds at the quarry, except for stone sold in the rough to other dealers. The product is hauled by wagon to Clovis (see photo No. 84). The largest block shipped weighed 16,800 pounds. Ten men were employed. Stone cutters receive $5 per day and quarrymen $3. The year 1913 was not a particularly active one, but improvement is reported for 1914.

Bibl.: Bull. 38, p. 26.

Boger Gravel Pit. D. and J. R. Boger, Friant, owners. This pit is in the SE. ¼ of SE. ¼, Sec. 7, T. 11 S., R. 21 E., at Friant, with a side track from the Southern Pacific Railroad. Work began here in 1900 and was for several years under lease to the Worswick Street Paving Company. The deposit is an old river bench above the present San Joaquin River bottoms. There are 7 to 15 feet of gravel, underlaid by 3 to 6 feet of clay (said to be suitable for pottery) below which are 36 feet of gravel reported to be gold bearing. Boger is considering putting in steam shovels after the clay is removed, to work the lower gravel for gold. The upper gravel, which is fine to medium, is moved by Fresno scrapers to a loading

Photo No. 82. In the quarry of Academy Granite Company, near Academy, Fresno County.

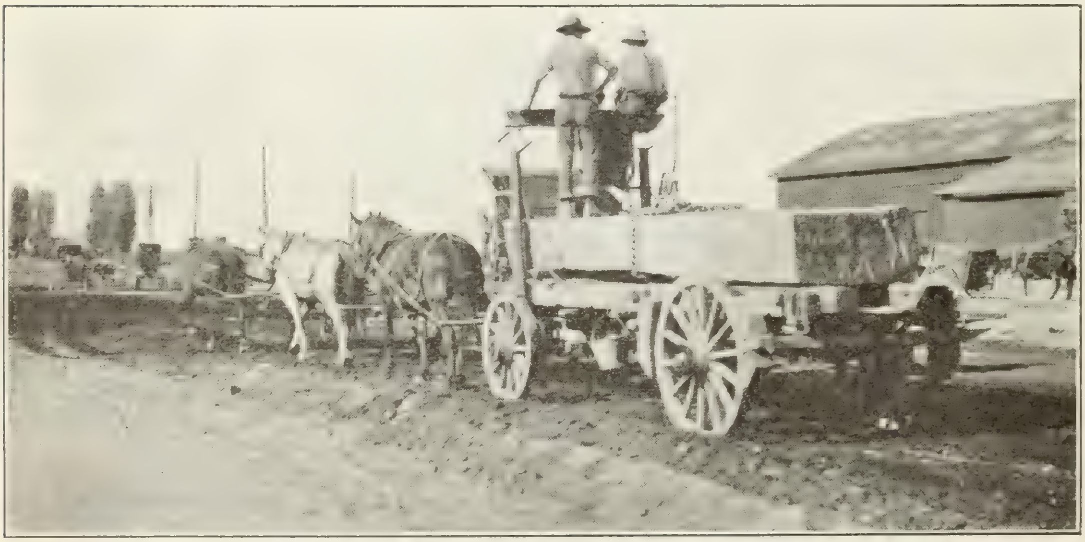

Photo No. 84. Block of stone (13,280 pounds) from Academy Granite Company, Fresno County.

pocket and then trammed to the railroad cars. It is not screened at present. Only one man was at work in August, though earlier in the year a larger force was employed.

California Road and Street Improvement Company (formerly Worswick Street Paving Company). R. D. Chittenden, president; P. E. Ludvigsen, secretary. Office, 218 Holland Building, Fresno. This pit is in Sec. 25, T. 11 S., R. 20 E., at Gravel Station on the Southern Pacific, 3 miles west of south from Friant. It has been worked by the present company since early in 1913. The gravel bed is on a bench above the present level of the San Joaquin River, but lower than the Boger gravel above described. The overburden varies from nothing to 6 feet in depth, and the gravel is about 15 feet deep. Five two-horse Fresno scrapers move the material to a pocket, from which it is elevated by a belt conveyer to the screening plant driven by a 100 h.p. electric motor. Two sizes only are made—sand, and up to 2½-inch ring, the oversize being crushed. Some is shipped without screening. There is considerable coarse material, consisting of diorite, basalt and various porphyritic rocks and some flinty material. The selling price is 40 cents, 45 cents and 50 cents per ton, f. o. b. Gravel Station. The capacity of the plant is 15 carloads (550 tons) per day, with average shipments of about ten cars daily. There were eighteen men and a foreman employed.

Doyle, Gill, Doyle & Company. Joseph Gill, manager. This company at Clovis operates a small "granite" quarry near the Academy quarry, 11 miles northeast of Clovis, under lease from N. Musick. The stone is the same, black, hornblende diorite occurring as large rounded boulders of disintegration at the surface, but more massive below. At the quarry a hand-operated derrick is used, while at the cutting sheds at Clovis, pneumatic tools are employed, electricity furnishing the power. Four men were at work in the sheds, the quarry being temporarily idle when visited in August.

Kings River Quarry. Atchison, Topeka and Santa Fe Railway, owner, leased to the Sharp & Fellows Contracting Company, 533 Central Building, Los Angeles; John Steigh, superintendent at the quarry. The quarry is in Sec. 8, T. 13 S., R. 24 E., on the Kings River at Piedra, the terminus of the Santa Fe's branch line from Reedley. Elevation 600 feet (bar.). It was opened up in the latter part of 1910, and there is now a quarry face over 100 feet high and 1000 feet wide. The rock is a fine-grained, blue-black basalt, partly in process of serpentinization. It is broken down by bank blasting, using both the "coyote hole" method and a drilling rig (air operated) on top of the bank. Firing is done by electricity.

A steam shovel loads the rock onto dump cars, which are drawn by a "dinkey" locomotive and discharged directly onto a No. 10 gyratory crusher. This crusher is driven by a 175 h.p. motor. The oversize is recrushed by smaller gyratories. The product is screened to four sizes, from $\frac{3}{8}$ to $2\frac{1}{4}$ inches. Equipment includes besides the crushers, belt and bucket elevators, two steam shovels and two dinkey locomotives. The shovels and locomotives burn oil, while electric power for the other parts of the plant is obtained from the San Joaquin Light and Power Company. The capacity is 1500 tons per day and an average of forty men are employed. The product is sold for road metal and concrete work and is loaded directly from the bins to the railroad cars (see photo No. 32).

Photo No. 32. Loading railroad cars at Kings River Quarry, Piedra, Fresno County.

San Joaquin Rock and Gravel Company. E. A. Forthcamp, president; C. Murray, secretary and manager. Office, 224 Edgerly Building, Fresno. The property is owned by A. G. Wishon and W. E. Durfy of Fresno, the company operating under a lease. It is in Sec. 18, T. 11 S., R. 21 E., 1 mile southwest of Friant, with a spur track from the Southern Pacific Railroad. This bed of gravel, about 30 feet thick, forms a bench above the present level of the San Joaquin River, being on the same bench as the California Road and Street Improvement Company farther south. Elevation about 345 feet (S. P.). The overburden averages 2½ feet. The plant has been enlarged and improved this summer (see photo No. 67). Electric power is obtained from the San Joaquin Light and Power Company. Fresno scrapers move the material to the belt elevator. It is then screened and washed to four sizes, 2-inch to 1-inch; 1-inch to ⅝-inch; ⅝-inch to ¼-inch; sand. The oversize is crushed by a 24″ x 13″ jaw crusher. The motors installed vary from 5 h.p. to 35 h.p. The capacity of the plant is 500 cubic yards per day, and fifteen to twenty men are employed, according to demand for the product.*

Photo No. 67. Gravel pit and plant of San Joaquin Rock and Gravel Company, near Friant, Fresno County.

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*Since the above was written, the property has been sold to the Grant Rock and Gravel Company of San Francisco, with offices in Fresno. The washing section of the plant has been enlarged and fully equipped to a capacity of 20 cars (of 40 tons each) per day of 10 hours. Hungarian riffles have been placed in the discharge boxes from the screens to the sand bunkers. Sufficient gold is being recovered in the riffles to pay the operating expenses of this section of the plant.

Sharp & Fellows (see Kings River quarry).

Worswick Street Paving Company (see California Road and Street Improvement Company).

TIN.

Tin ore, occurring with wolframite, is reported by Fred Nobs of Redwood City, in the high Sierran section in eastern Fresno County. The exact locality is not stated.

TUNGSTEN.

L. H. Rhodes and G. E. Brown, of Coalinga, report having made locations on a deposit of tungsten ore in Secs. 29 or 33, T. 18 S., R. 13 E., about 30 miles northwest from Coalinga, near the San Benito County line.

Wm. Terrill of Trimmer has a claim near Trimmer, on a vein carrying scheelite with some gold values. The vein is stated to be 5 feet wide, strike east and west, dip south, with limestone footwall and granite hanging. The scheelite makes in bunches on the hanging-wall side of the vein. It probably would require concentration.

VOLCANIC ASH

Fort Miller Ranch Deposit. McKenzie Estate, owner, Griffith-McKenzie Building, Fresno. On this ranch, 3 miles northeast of Friant, there is a deposit of very fine-grained volcanic ash, 40 to 50 feet thick, over an area of several acres. It occurs in a number of small hills in a basin with a granite rim. Occasional pieces of vesicular pumice are found, but not in sufficient quantity to be of commercial value.

KERN COUNTY.

By G. CHESTER BROWN, FIELD ASSISTANT.

Field Work in September, 1914.

Introduction.

Kern, the leading mineral producing county of California, consisting of 8100 square miles, was organized in April, 1866. It is the third largest county in the State, and is bounded on the north by Tulare, Kings, and Inyo, on the south by Los Angeles and Ventura, on the east by San Bernardino, and on the west by San Luis Obispo. It is characterized by greater variety and contrasts of topography, geology, climate, and resources than any other California county.

This territory embraces the southern end of the San Joaquin Valley, thus affording a large area of land for agricultural purposes.

The wonderful development of the petroleum industry since 1900 has given Kern County first place as a mineral producer.

Topography.

Kern County takes in the southern portion of the Sierra Nevada Range, includes a portion of the Coast Range in its western end, and to the south and east of the Sierras it encloses a large section of the Mojave Desert. The lowest depressions are in its lagoons, where its rivers sink in the plains, some 300 feet above the sea level. It rises from that to 10,000 feet in the high peaks of the Sierra Nevada, its desert region east of the mountains having an elevation of 2751 feet at Mojave, and the mountains to the southwest over 6000 feet. The Sierra Nevada crosses the county from the north; Tehachapi Pass, 3964 feet in height, leading southeasterly; Tejon Pass, 5285 feet, and Cañada de las Uvas, about the same, leading southerly.

Along the northwestern border is the Diablo Range rising to a height of from 2000 to 3000 feet. From the junction of the Sierra Nevada and the Coast ranges, the San Emigdio mountains project 20 miles northward into the valley.

In the central portion of the southern end of the valley are Kern and Buena Vista lakes, the first covering an area of 13 square miles, and the other 25 square miles, receiving the water of the Kern River through a large number of sloughs, creating an extensive delta of marsh lands. This section has a drainage by Buena Vista Slough to Tulare Lake, 35 miles northwest. By the diversion of the water of Kern River and drainage of the basins, the lakes have become practically dry and much of their former beds are under cultivation.

There are in the county numerous mountain valleys of considerable extent. Poso Flat, Little Poso, and Linn Valley are beautiful parks on Poso Creek, in Greenhorn Mountains, a spur of the Sierra Nevada, west of Kern River. Havilah, once the county seat, and a famous mining town, is in a deep valley of Clear Creek, a branch of Kern, 35 miles northeast of Bakersfield. Tehachapi Valley extends from the summit of the Sierra Nevada at Tehachapi Pass southeast along the valley of Cameron Creek, into the Mojave Desert, having a length of some 8 miles, and from ¼ to 1 mile in width, containing the town of the same name and numerous thrifty farms. Southwest of these are the similar valleys of the Tejon, Las Uvas, San Emigdio, Zapatero, Palita, Castera, and La Siebra.

Streams.

Kern River and Poso Creek are the principal streams of the county, Kern being the third in magnitude of the rivers flowing from the Sierra Nevada south of the Sacramento (see photo No. 1). This river, with a catchment area of 2383 square miles, rises among the highest peaks of the Sierra Nevada, in the northeastern part of Tulare County, having two large forks flowing southwesterly 125 miles. The stream carries an average flow of 805 cubic feet per second, with a flood flow averaging 2000 second feet. This water flows down a granite channel, dropping 8000 feet before entering the valley, and is one of the important streams of the State for the generating of hydroelectric power. It enters the valley near Bakersfield, then flowing westward divides into many channels, forming an extensive delta known as Kern Island.

Thirty large irrigating canals, comprising a total length of over 300 miles, divert water from this river, and serve some 270,000 acres of fertile and productive land.

Poso Creek has its source in many branches high up in the Greenhorn Mountains, the lofty spurs of the Sierra, rising in T. 25 S., R. 30 and 31 E., flowing southerly some 25 miles, then westerly and northwesterly until it sinks in the great valley in T. 25 S., R. 23 E., after a winding course of 75 miles. It has a watershed of 468 square miles.

South of Tulare Lake is a region called the ''artesian belt,'' which is 35 miles long and from 8 to 12 miles wide, running east and west, for the most part in the heart of the plains. About 150 wells supply water for domestic, stock and irrigation purposes. In the Mountain View Colony there is an artesian well which has thrown 450 gallons a minute for twenty years.

Climatic conditions.

Mining operations can be pursued throughout the entire year, as the snowfall, even in the mountainous regions, is not heavy enough to interfere with the work. On the plains the rainfall amounts to about 8 inches per year; the temperature in July or August may reach 110° F., but the absence of humidity makes work not disagreeable.

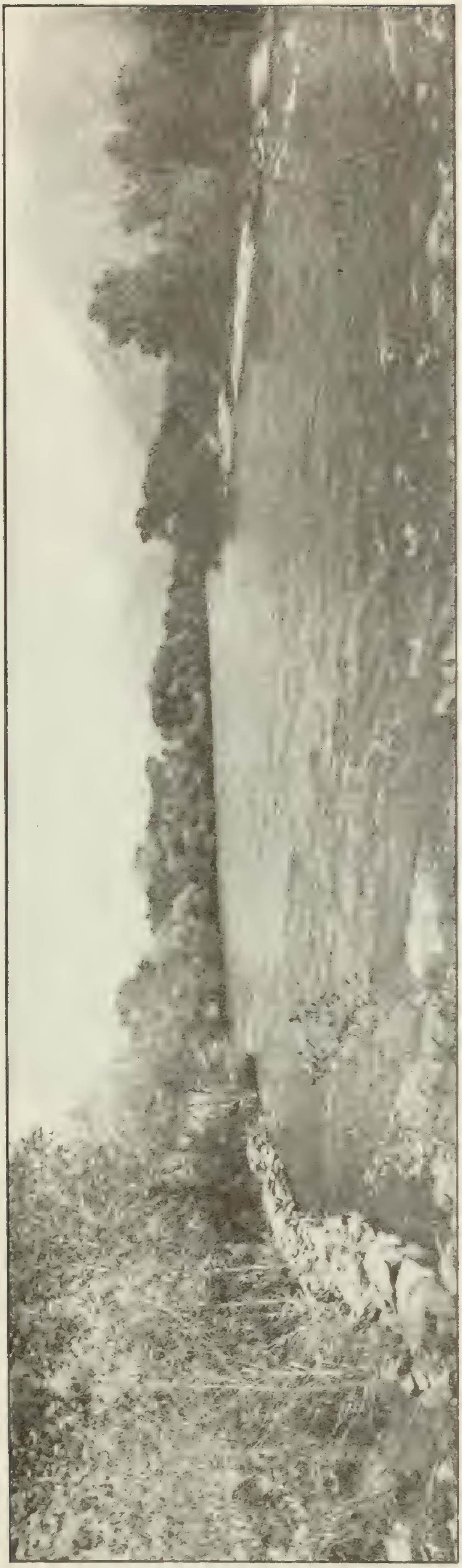

Photo No. 1. Kern River, above Kernville, during flood period.

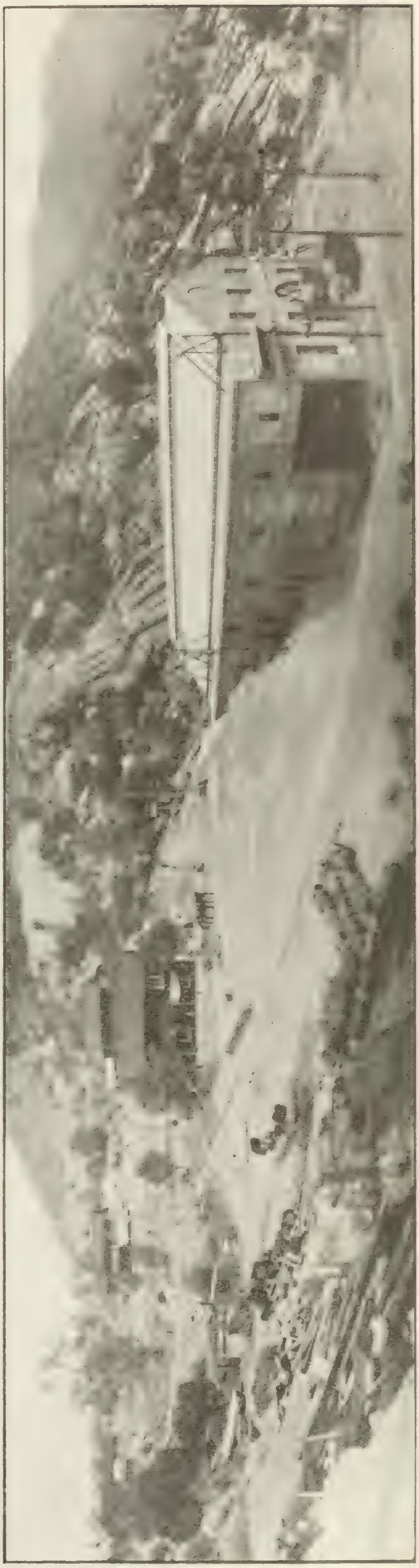

Photo No. 2. Borel generating plant, Pacific Light and Power Company.

Transportation facilities.

Two great transcontinental railroads, the Southern Pacific and the Santa Fe, pass through the center of the county, in a northerly and southerly direction. From Mojave the Southern Pacific owns and operates the Nevada and California Railroad, reaching Owens River Valley and passing through Nevada to connect with the Southern Pacific, Ogden Route. In the main valley a line of the Southern Pacific runs from Famosa to the east side. The oil fields are reached by branch lines from Bakersfield. Good wagon roads connect the mining districts with the railroads.

Photo No. 3. Canal, Pacific Light and Power Company.

Hydroelectric plants.

Pacific Light and Power Corporation maintains a power station at Borel, on the Kern River, which generates 18,000 horsepower, part of which is distributed for mining purposes in the vicinity of Hot Springs Valley, and the balance transmitted to Los Angeles (see photo No. 2). The company also operates a transmission line at 150,000 volts (the highest in the world) through Kern County, from two plants in Fresno, and maintains a substation at Magunden, 4 miles east of Bakersfield.

The intake for the Borel power plant is at Kernville, below the mill and powerhouse of the Kern Development Company. The canals and tunnels are lined with concrete and have a capacity of 30,000 miner's inches of water (see photo No. 3).

KERN COUNTY—Table of Mineral Production.

Year	Antimony		Asphaltum		Brick		Copper		Fuller's earth		Gold	Lime		Limestone		Silver	Natural gas		Petroleum		Miscellaneous and unapportioned	
	Tons	Value	Tons	Value	Thousands	Value	Pounds	Value	Tons	Value	Value	Barrels	Value	Tons	Value	Value	1,000 cubic feet	Value	Barrels	Value	Kind	Value
1880											$94,214					$390						
1881											190,000					14,000						
1882											260,000					20,000						
1883											150,000					5,000						
1884											100,000					5,000						
1885											72,003											
1886											94,640					1,721						
1887											72,358					150						
1888											60,000					2,500						
1889											242,676					7,517						
1890											117,341					586						
1891											107,735					61						
1892											107,738					73						
1893											83,665					1,754						
1894	92	$3,720	6,900	$138,000							310,707	33,000	$26,500			39,700			11,215	$69,334		
1895	33	1,485	1,400	28,000							231,433	25,400	24,960		$10,000	46,064			116	116		
1896	15	2,250	2,484	44,680							590,867	37,100	32,329	5,000	5,000	34,650			235	235		
1897	25	3,500	4,650	86,350	1,100	$6,600					754,313	53,400	70,370			10,471						
1898	40	1,200	1,850	50,000	2,000	14,000					1,017,930	42,000	29,900			6,543			10,000	10,000	220 tons coal 27 tons borax	$1,100 3,382
1899			2,537	57,670	1,600	11,400			620	$12,400	863,414	64,700	57,690			6,810			15,000	13,500		
1900			701	14,020	2,525	17,300	4,000	$750	500	3,750	805,252	57,721	51,700			147,736			919,275	827,348	Unapportioned, 1900-1909	859,927
1901	50	8,350	3,112	43,126	4,600	23,400	429,248	67,606	1,000	19,500	1,007,059	62,000	82,700			40,497			3,902,125	1,131,616	1,600 pounds lead	64
1902			10,150	101,500	3,500	24,500	235,840	27,122	987	19,246	1,165,982	99,360	80,856			99,135			9,777,948	1,955,585	1,000 tons gypsum	8,000
1903			8,006	100,787	9,000	30,060	4,300	559	250	4,750	1,022,353	101,661	76,246			114,614			18,001,148	3,600,230	28 tons bituminous rock 1,000 tons gypsum	63 8,000
1904			12,451	124,110	700	4,900			500	9,500	1,426,523	178,038	172,000			151,189			19,608,045	3,431,408		
1905			10,586	105,860	750	6,000					1,160,971	279,650	255,500		44,000	134,944			17,069,715	3,174,966	53 tons clay 1,350 tons gypsum 52 tons tungsten	54 11,000 18,800
1906			23,136	231,360	4,275	34,200					806,117	295,613	267,096			129,503			13,826,000	3,765,200	215 tons clay Tungsten	752 183,600
1907			20,443	260,158	2,168	18,428					878,798	175,000	169,822			86,033			15,700,308	4,673,867	1,000 tons gypsum	5,500
1908			50,000	475,000	2,080	19,552					827,087	116,717	87,788			96,550			18,777,871	9,388,935	500 tons gypsum	2,000
1909			54,599	655,391	3,365	29,634			359	5,385	654,799	115,709	88,869			101,633	38,000	$2,714	24,549,758	12,565,246	Gems 1,700 tons gypsum 4,781 pounds lead	500 8,300 174
1910			76,605	811,846	8,332	63,711					619,974	99,187	86,198		4,331	35,041	975,724	47,364	40,641,159	17,825,212	1,675 tons gypsum 160,000 tons rubble	8,305 112,000
1911					5,603	41,426	29,441	3,680			557,471	96,500	82,025	600	400	5,833		165,438	46,562,825	20,207,906	242 tons clay 230,950 tons crushed rock 853 tons gypsum 2,417 pounds lead	121 107,880 4,245 109
1912					1,890	23,120					830,421	162,831	124,894			11,480		325,484	51,448,067	21,762,532	8,479 tons gypsum 19,664 pounds lead	18,188 885
1913					1,625	22,000	3,498	542			649,712	135,000	91,200			11,851	7,111,237	568,899	58,698,432	27,038,474	208 tons clay 10,000 tons gypsum 1,376 pounds lead Other minerals	104 22,750 61 600
Totals	255	$20,505	289,610	$3,327,858	55,113	$390,171	706,327	$100,259	4,216	$74,531	$17,933,553	2,230,587	$1,958,663		$63,731	$1,369,029		$1,109,899	339,519,242	$131,441,710		$1,386,464

Totals.

Antimony	$20,505
Asphaltum	3,327,858
Brick	390,171
Copper	100,259
Fuller's earth	74,531
Gold	17,933,553
Lime	1,958,663
Limestone	63,731
Natural gas	1,109,899
Petroleum	131,441,710
Silver	1,369,029
Unapportioned and miscellaneous	1,386,464
Total to end of 1913	$159,176,373

San Joaquin Light and Power Corporation maintains a generating plant at the mouth of the canyon of the Kern River (1350 kilowatts capacity), and a steam plant in Bakersfield (13,500 kilowatts capacity). This corporation distributes power in the Kern River, Midway, McKittrick, and Sunset oil fields for the purpose of pumping oil.

The Bakersfield electric street car system is operated by the San Joaquin Light and Power Corporation.

Southern California Edison Company maintains a generating plant on the Kern River of 30,000 horsepower capacity, and from this plant current is delivered to Los Angeles, 116 miles distant. In the construction of this plant, the canal, which is 8⅔ miles long, consists almost entirely of tunnel, with inside measurements of 8 by 9 feet cut through solid rock to a point above where the powerhouse is located. Another plant on the Kern River, now under construction, will exceed 30,000 horsepower capacity. A railroad survey has been completed to connect with the Southern Pacific Railroad in order that the power equipment may be delivered at this powerhouse by rail. Two additional power stations are to be constructed at points selected on the Kern River, above Kernville.

Mineral resources.

Kern County's mineral resources consist of antimony, asphalt, barite, borax, brick, cement, clay, copper, fuller's earth, gems, gold, gypsum, iron, lead, lime, limestone, magnesite, marble, mineral paint, natural gas, petroleum, potash, salt, soapstone, soda, silver, stone industry, sulphur, tungsten and molybdenum.

ANTIMONY.

Antimony is found on a spur of the mountain bordering San Emigdio Canyon, in Secs. 10 and 15, T. 9 N., R. 21 W., S. B. M., also on Erskine Creek, 4 miles south of Hot Springs, in Sec. 23, T. 27 S., R. 33 E., M. D. M., and 10 miles west of Koehn in Secs. 5 and 6, T. 30 S., R. 36 E., M. D. M.

The San Emigdio and Tom Moore are the only properties that have been worked to any extent. The high cost of transportation and low market value of the product made it impossible to work the ore at a profit.

Antimony Consolidated Mines, formerly known as Mojave Antimony Company, consisting of 80 acres of patented ground, is located in Secs. 5 and 6, T. 30 S., R. 36 E., M. D. M., about 10 miles west of Koehn, and 12 miles northeast from Mojave. Owned by Arthur Asher, 225 S. Los Angeles street, Los Angeles. Ledge is 5 feet wide. Developed by means of shallow shafts and open cuts. Idle for several years.

Rayo, consisting of 40 acres, is located in Sec. 36, T. 26 S., R. 33 E., M. D. M., about 6 miles southeast of Isabella and 37 miles north of Caliente, the nearest railroad station. Ledge from 3 to 10 feet wide; developed slightly by shallow shafts and open cuts. Idle for several years.

San Emigdio, one of the oldest mineral locations in Kern County, is owned by the Kern County Land Company, of Bakersfield. The holdings consist of 80 acres, patented, in Secs. 9 and 10, T. 9 N., R. 21 W., S. B. M., about 12 miles southwest of Sunset. The ledge is 11 feet wide, strike north and south, dip 68° W., porphyry walls. Workings consist of several tunnels from 20 to 600 feet long (caved in a number of places). The ore was roasted in an old furnace (dismantled). Some of the ore gave returns of 45 per cent antimony and from $4 to $16 per ton in silver. Property said to have been worked by the padres during missionary period; reopened in 1876 by S. Bouchier. Idle for a number of years.

Bibl.: Reports VIII, p. 680; X, p. 225.

Tom Moore, also known as Erskine Creek, consisting of 10 acres, patented in 1882, is located in Sec. 24, T. 27 S., R. 33 E., M. D. M., about 36 miles north of Caliente in the Valley View mining district. Owned by Orejana Mining Company, of Hayward; C. S. Long, president. Ledge is 3 feet wide, strike north and south, dip 50° E., granite-porphyry walls. Workings consist of a number of shafts from 40 to 65 feet deep, and open cuts. Some of the ore carried 65 per cent antimony and was reduced years ago in an old furnace, now dismantled. Property idle for several years.

Bibl.: Report X, p. 237.

ASBESTOS.

A serpentine belt cutting Jawbone Canyon carries asbestos in the form of chrysotile, being especially noticeable in Sec. 7, T. 30 S., R. 36 E., M. D. M.

Sunshine, consisting of three claims located in 1912 by J. H. Durnal, of Tehachapi, is situated in Sec. 7, T. 30 S., R. 36 E., M. D. M., about 23 miles north of Mojave by wagon road. Ledge is 10 feet wide, strike northeast and southwest, dip 40° S., serpentine walls, and can be traced on the surface for a distance of 150 feet. Prospect, undeveloped.

ASPHALT.

Deposits of natural asphalt are found in the Buena Vista and the Sunset oil districts. In recent years refined asphalt only has been used commercially because a better grade can be produced for less money than the deposits of natural asphalt afford.

Bibl.: Report XII, pp. 26–28; Bull. 3, pp. 41–53.

BORAX AND POTASH.

The Mojave Desert contains a host of dry lakes and sinks which are the source of many salines, especially borax and potash.

Buckhorn Springs, about 20 miles east of Mojave, in T. 9 N., R. 9 W., S. B. M., occupy the south end of a large dry lake, and here are found considerable deposits of borates mixed with salt and other salines.

Indian Springs are situated in T. 26 S., R. 38 E., M. D. M., in the west side of the Salt Wells Valley. Borax is present, mixed with salt, soda and other salines. Beds have not been exploited.

Kane Springs, also known as Mesquite, Cane, and Desert Springs, are located in T. 30 S., R. 38 E., M. D. M. Deposit discovered in 1873 by H. J. Lent, who produced some borax of excellent quality here years ago, but beds have been idle for some time. The rich borate spots cover 3 acres.

Teagle-Churchill Potash Company owns 5792 acres in T. 25 S., R. 40 and 41 E., known as China Borax Lake and Salt Wells Lake, which were located in 1911. This company consists of E. E. Teagle, C. H. Churchill, and associates. It is proposed to drill and pump the deposit for treatment to produce borax and potash. Searles Lake is 2 miles east.

Bibl.: Bull. 24, p. 50. The Saline Deposits of California, issued by State Mining Bureau.

BRICK AND CLAY.

The clay deposits in the vicinity of Bakersfield, the county seat of Kern County, furnish excellent material for the manufacture of brick.

An unusually good grade of pottery clay is obtained from a large deposit in Sec. 11, T. 9 N., R. 13 W., S. B. M., about 5 miles northwest of Rosamond Station, which has been worked by the Los Angeles Pottery Company.

Bakersfield Sandstone Brick Company own a clay deposit consisting of 10 acres (patented) in Sec. 28, T. 29 S., R. 23 E., M. D. M., in East Bakersfield. Home office is Bakersfield. W. S. Tevis, president; Jas. Curran, manager. The plant consists of Kommick-Elbring grinder, kilns of a daily capacity of 40,000 brick, cars for holding brick when drying, buildings, etc. Two classes of brick are manufactured: sandstone selling for $15 per 1000 for red, $13 for select and $9 for second grade; clay brick sells for $9 per 1000. Twenty-five men are employed. Some clay is purchased from the East Side Canal Company. Oil is used for fuel.

Kern County Brick Company's holdings consist of 12 acres, patented, in Sec. 21, T. 29 S., R. 28 E., M. D. M., in East Bakersfield. O. V. Paye, of Bakersfield, controls this corporation. The deposit is 25 feet thick and has been worked for twenty years. The plant consists of Potts disintegrator, kilns, buildings, etc. Capacity of plant is 37,000 brick per day, which sell for $8 per 1000 at the yard; cost of manufacturing about $4 per 1000. Ten men employed. Oil used for fuel, costing 40 cents per barrel.

Los Angeles Pottery Company, also known as the Hamilton deposit, owns 40 acres in Sec. 11, T. 9 N., R. 13 W., S. B. M., some 5 miles northwest of Rosamond Station. The deposit covers about 5 acres, the clay being plastic, has a smooth, even texture, shows no evidence of stratification, and is about 25 feet thick. It varies in color from greenish to light gray, and has been used for the manufacture of pottery and firebrick. Material has been shipped to the company's plant at Los Angeles. Workings consist of a tunnel 200 feet long, and a pit about 45 feet deep. Idle for several years.

Bibl.: State Mining Bureau Bull. No. 38, p. 212.

Photo No. 4. Cement plant at Monolith, erected by City of Los Angeles.

CEMENT.

Los Angeles Aqueduct Plant was constructed by the city of Los Angeles to manufacture cement for use in constructing the Owens River water supply system. The holdings, consisting of 120 acres, are located in Sec. 14, T. 32 S., R. 33 E., M. D. M., at Monolith Station, 3 miles east of the town of Tehachapi (see photo No. 4).

Limestone was obtained near the plant, and also from the Summit quarry. An ample supply of clay was extracted from a pit near the works. The plant has a daily capacity of 1250 tons, operated by electricity from Pacific Light and Power Corporation.

COAL.

Small seams of coal 18 inches wide, in the vicinity of Garlock, T. 28 S., R. 38 E., M. D. M., were worked some years ago by the Randsburg Coal Company. Three shafts, 80, 145 and 150 feet in depth, were sunk on the vein.

COPPER.

The copper occurrences are so few and widely separated, as far as discovered, that they can not be identified with any particular belt. Copper deposits exist in three localities: Near Woody, north of Randsburg; on the northern edge of the Mojave Desert; and on the southeastern slope of the Sierras, in Secs. 7, 18, 19 and 30, T. 28 S., R. 40 E., M. D. M., and in Secs. 12, 13 and 24, T. 28 S., R. 39 E.

The road from Randsburg to the south fork of the Kern River, through Walker's Pass, diagonally crosses copper croppings in T. 27 S., R. 38 and 39 E., M. D. M.

The country rock in the Keyes mining district in Secs. 29 and 31, T. 26 and 27 S., R. 33 E., M. D. M., is impregnated with copper carbonates, and a small amount of development work has been done in this territory in prospecting for gold. Greenback is the only producing copper mine in the county.

Copper King, consisting of 40 acres, is located in Sec. 3, T. 27 S., R. 33 E., M. D. M., in the Keyes mining district, about 6 miles southwest of Isabella, in the Sequcia National Forest Reserve. Owner, G. C. Hooper. Elevation 5500 feet; vein matter, consisting of country rock with copper carbonates, about 10 feet wide, strike northwest and southeast, dip 30° N.; slate footwall and granite hanging. Slightly developed with a tunnel 230 feet in length. A little high grade ore found, carrying gold values. Prospect.

Greenback Group, the largest copper mine in Kern County, is located in Secs. 1, 2, 3, 4, and 10, T. 26 S., R. 29 E., in the town of Woody and 32 miles northeast of Bakersfield. The holdings, consisting of 2300 acres (600 patented), are owned by I. Weringer, of Woody. Elevation 1800 feet; discovered in the early fifties, and surface worked for gold values. Located in 1890 by present owner. Six parallel veins about 600 feet apart; average width 30 feet; strike northeast and southwest, dip 60° N.; granite walls. On the Iron Mountain Chief the croppings are pronounced. Workings consist of a single-compartment shaft 200 feet deep, sunk at 45° angle, three levels at 100′, 140′ and 200′; 360 feet of drifts; 100 feet raise. The equipment consists of horse whim, ore bin, cars, tools and assay office. Two men employed. Ore recently shipped to smelter was hauled in motor trucks to MacFarland, a distance of 25 miles, at a cost of $5 per ton. Property produced to date $40,000; about 4000 tons of ore on dump and considerable in sight in mine. Sulphide at 60-foot depth, runs from 5% to 30% copper and $2 per ton in gold. Iron Mountain Wonder adjoins Greenback on the south.

Bibl.: Bull. 50, p. 297, issued by State Mining Bureau.

Iron Mountain Wonder consists of 20 acres in Sec. 10, T. 26 S., R. 29 E., about ¼ mile east of Woody. Owners, Hancock and Sorenson, of Woody. Two parallel veins about 20 feet wide, strike northeast and southwest; dip 60° N.; granite walls. Slightly developed with 60-foot shaft and 80-foot tunnel; continuation of Greenback lode. Prospect. Idle.

Silverado Mountains, consisting of 40 acres, is located in Sec. 29, T. 26 S., R. 33 E., in the Keyes mining district, 1 mile south of Isabella, in Sequoia Forest Reserve. Owner, C. L. Warfield. Elevation 3500 feet. Fissure vein, 3 feet wide, consisting of greenish colored quartz, carrying copper carbonates and gold; strike northwest and southeast, dip 60° SW. Developed with two tunnels on vein, 210 and 620 feet in length. Worked for a time by lessees, who took out some rich ore from pockets. Prospect. Idle.

FULLER'S EARTH.

Fuller's earth is a soft, friable clay, that is used in fulling wool, in deodorizing and clarifying oils, fats, greases, and in the production of clay pigments as a basis for color printing on wall papers. It falls to powder readily in water, and removes with avidity grease from cloth. The shades of color of fuller's earth are fully as great as those of other kinds of clay. Most of the earths on the market are light brown, gray, buff, or cream color, and a few are almost white. All which have been found valuable for bleaching purposes show a distinct acid reaction. Fuller's earth, as a rule, is lighter and more porous than other clays. The market value ranges from $10 to $15 per ton.

California Fuller's Earth Company. Packard Estate, Bakersfield, owners, control 140 acres (patented) in Sec. 14, T. 27 S., R. 28 E., M. D. M., about 18 miles north of Bakersfield. This deposit covers many acres and varies in thickness from 15 to 50 feet. A thin layer of soil covers this earth, which is first removed and then the material is taken out in open pits. Deposit was first worked in 1898 by

H. L. Packard, and the material hauled to Bakersfield, ground, and shipped to Kansas City, Mo., for refining animal and vegetable oils. Property has not been worked for several years.

The analysis of the earth shows:

Silica (SiO_2)	54.32%
Alumina (Al_2O_3)	18.88%
Iron oxide (Fe_2O_3)	6.50%
Lime (CaO)	1.00%
Magnesia (MgO	3.22%
Loss on ignition	11.86%
Alkalies (by difference)	4.21%

Bibl.: Bull. 38, p. 275, issued by California State Mining Bureau.

The Eight Oil Company, with a small grinding plant at Bakersfield, has reported production of fuller's earth from Kern County.

GOLD.

The first discovery of gold in Kern County was made by a member of Fremont's party in 1851, at Greenhorn Gulch, near the Kern River. Here a camp soon sprang up, and it is claimed that some of the placer ground yielded $50 to the pan. This territory was known in the early days as Whiskey Flat.

Jonathan and Keyes, shortly after the Whiskey Flat excitement, made the first quartz discovery in Rich Gulch, near the site of the old town of Keyesville. The first mine was named the Brother Jonathan, an arrastra was built, and as the ore ran over $100 per ton they made money. The Mammoth mine near by, was located after the Brother Jonathan discovery, and Captain Maltby, the owner, erected a costly water power mill, which was a failure, as the mortars leaked out the quicksilver that was recklessly thrown in. Colonel Keyes erected the first practical wooden stem, hog trough, iron mortar mill, consisting of four stamps. The cost of mining and milling was $15 per ton and, as the ore ran over $100 per ton, a handsome profit was made.

In 1861 Rogers and Olds discovered the mines of the Cove district, near Kernville, which have produced several millions, and which were extensively worked for over twenty-five years.

The discovery and working of the mines of the Cove district were a great incentive to prospecting, and resulted in the finding of the Clear Creek quartz mines by Ben Mitchell. The town of Havilah was built, and at one time was the county seat of Kern County.

The discovery of placer gold at Goler, in 1893, led to the development of quartz mines in this section, as the Yellow Aster find soon followed, which caused the Rand to be the largest producing district in the county.

Mining districts.

Amalie, also known as the Agua Caliente mining district, is the name used to designate the territory between the most southerly summits of Pah Ute range and Caliente Creek.

The characteristic geological features of the district consist of syenite and slate formations traversed by numerous trachytic dikes. The altitude ranges from 2500 feet on Caliente Creek to 7000 feet in the Pah Ute range.

A good wagon road connects this district with Caliente, a town on the Tehachapi branch of the Southern Pacific Railroad. Amalie, a small settlement in the center of the district, is 15 miles east of Caliente.

Clear Creek, 25 miles north of Caliente, by wagon road, includes the territory in T. 28 S., R. 32 E., M. D. M. The formations consist of syenite and slates, cut by numerous diorite dikes. The altitude ranges from 3000 to 5500 feet. Havilah, a small settlement on Clear Creek, is the post office.

Cove, one of the famous mining districts in the county, is 42 miles north of Caliente, by wagon road (see photo No. 5). The natural amphitheater occupied by this territory is the characteristic which gives it its name. The formations consist of granite and slate, the former predominating. Nine lodes can be traced on the surface for a considerable distance, as the croppings are very bold. The value of the main lode (Sumner) lies in its great size and the vast amount of good milling rock which it can furnish; it is over 150 feet wide in places. The Nellie Dent and Commonwealth lodes are also of unusual width, carrying low grade gold values. The installation of large reduction plants will make this district one of the best producers in Kern County, as an abundance of water from the Kern River for power purposes, topography suitable for open-cut mining, and ideal climatic conditions afford very cheap mining and milling costs. The altitude ranges from 2600 to 5000 feet.

Green Horn Mountain District includes the territory adjacent to the Green Horn Mountains, about 48 miles north of Caliente, by wagon road, in T. 26 and 27 S., R. 31 and 32 E. This region adjoins the Keyes mining district on the west. The formations consist of granite and slate. A limited amount of placer mining is pursued in this section. The altitude ranges from 3000 to 6500 feet.

Green Mountain District includes the territory from Piute post office to Kelsey Valley on the east dip of Piute Mountain, T. 28 and 29 S., R. 34 E. Piute post office is 30 miles northeast of Caliente by wagon road. The formations consist of slate and schists, cut by diorite dikes. The veins, as a rule, are small but rich; the ore shoots are short. Pocket mining is pursued mainly in this district. The altitude ranges from 3500 to 8000 feet.

Keyes, the oldest mining district in Kern County, includes the territory north and west of the old site of Keyesville for a distance of about 5 miles, in T. 26 S., R. 32 and 33 E. Isabella, the post office, is 37 miles north of Caliente, by wagon road. Granite is the predominating formation. The veins are narrow, but carry good values in gold. The Keyes quartz mine has been worked intermittently for sixty-two years. Placer mining was extensively pursued here during the fifties.

Long Tom District, 20 miles northeast of Bakersfield, in T. 27 S., R. 29 E., M. D. M., is known chiefly on account of the Long Tom mine, which was a famous producer several years ago. The formations consist of diabase and granite. A good wagon road affords an easy means of transportation between this district and Bakersfield, the county seat. The altitude ranges from 1500 to 2500 feet.

Mojave District includes the territory in T. 10 and 11 N., R. 11, 12, and 13 W., S. B. M. The principal mines are only 3 miles south of Mojave, a town on the junction of the Santa Fe and Southern Pacific railroads. The formations consist of quartz-porphyry, phonolite and granite. The veins are large, with lenses of high grade, so that practically all of the ore can be profitably worked with adequate reduction plants. The lack of timber is no handicap as the ground stands well. The climatic conditions are good, being similar to other sections of the Mojave Desert.

The Pioneer District includes the territory in an easterly and westerly direction between Greenhorn Mountains and the Green Mountain mining district, and in a northerly and southerly direction from Clear Creek to Erskine Creek, in T. 27 and 28 S., R. 32 and 33 E., M. D. M. The formations consist of granite, porphyry, slate, and syenite. Bodfish, the post office, is 32 miles north of Caliente by wagon road. Mining operations can be pursued throughout the year. Wood and water are abundant. The altitude ranges from 3000 to 8000 feet.

Rand Mining District comprises the territory in T. 29 and 30 S., R. 40 E., M. D. M., Kern County, and T. 29 and 30 S., R. 41 E., M. D. M., San Bernardino County. The formations consist of granite, andesites, basalt, schists, sandstone, limestone and quartzite. The rocks of Rand Mountain are schists, with quartzite and altered limestones. The fragmental deposits, such as sand and gravel, cover considerable areas, but only a small portion are of economic importance.

Gold was first discovered in the Goler Wash, 9 miles northwest of Randsburg in 1893, and dry washing camps soon sprang up in Last Chance and Red Rock canyons, and at Summit Diggings. In 1895 the Yellow Aster mine was discovered by Singleton, Burcham & Mooers, and other quartz discoveries quickly followed. A railroad was

Photo No. 5. Cove Mining District, looking north.

Photo No. 6. Amalie mine, mill and hoist.

soon constructed from Kramer, on the Atchison, Topeka and Santa Fe Railroad, to Johannesburg. A number of mines, after taking out fair ores near the surface, were unable to follow them downward owing to faulting, pinching of the vein, or impoverishment of the ores and have been abandoned. Mines, including placers, have produced $10,000,000, of which the Yellow Aster has taken out $6,000,000.

In the old Stringer District, so named on account of narrowness of the veins, some rich ore has been worked. This section is located along the southeast side of Rand Mountains, from 1½ to 4 miles southwest of Randsburg. The Napoleon is said to have yielded $1,000 per foot from a shaft 100 feet deep. The veins in this district are all more or less disturbed by faults, having a maximum width of 2 feet (U. S. Geol. Surv., Bull. No. 430). The altitude ranges from 3500 to 5000 feet.

The Red Dog custom mill, about ¼ mile southwest of Johannesburg, handles ores from the Rand district. This plant is owned by Stanford Mining and Reduction Company, of Los Angeles, and consists of ten stamps, cyanide plant, and one Standard concentrator, operated by steam and electricity.

Tehachapi District includes the territory in T. 32 S., R. 33 and 34 E., M. D. M., and T. 11 N., R. 14 and 15 W., S. B. M. The formations consist of granite, quartz-porphyry, limestone and basalt. The Pine Tree is the only gold mine with any production record. The mining industry at the present time is confined to the extraction of limestone. The altitude ranges from 3900 to 6000 feet.

Woody, formerly White River mining district, includes the territory in T. 25 and 26 S., R. 29 and 30 E., M. D. M. Woody, the post office, is 31 miles northeast of Bakersfield, by wagon road. The formations consist of granite, quartz-porphyry and slate. The veins, as a rule, are narrow and have been disturbed by faults. Mining has been confined to shallow workings. Rich ore has been found on the surface, and as a result this district was very active some eighteen years ago Placer mining was extensively pursued near Woody during the '50s. The altitude ranges from 1800 to 3000 feet.

Valley View District includes a portion of the territory in T. 27 and 28 S., R. 33 and 34 E., M. D. M., along Clear and Erskine creeks, about 35 miles north of Caliente. The formations consist of granite, syenite and slate, cut by numerous diorite dikes. The veins are from 2 to 8 feet in width, carrying good milling values. An ample supply of wood and water is at hand. The mineral resources of this district are still undeveloped. The altitude ranges from 3500 to 7500 feet.

Mines and prospects.

Accident, consisting of 40 acres, is located in Sec. 32, T. 11 N., R. 12 W., S. B. M., about 3 miles south of Mojave, in the Mojave mining district. It is a prospect slightly developed by short tunnels on the vein. Owner, G. E. Ashler.

Amalie, one of the famous old producers of this county, is located in Sec. 22, T. 30 S., R. 33 E., M. D. M., about 18 miles northeast of Caliente, in the Amalie mining district (see photo No. 6). The holdings consist of 180 acres in the Sequoia National Forest Reserve, owned by the Provident Mining Company; T. Bowden, president; B. W. Marks, secretary; home office, Union Trust building, Los Angeles. The vein is narrow, averaging about 10 inches in width, but rich; strike NW. and SE., dip 40° E., quartz-porphyry walls. Pay shoot is about 180 feet long and 10 inches wide, free milling. Ore carries considerable silver below the surface oxides, rich on the surface in free gold. Workings consist of a vertical shaft 560 feet deep, five levels, raises, stopes and drifts, comprising over 5000 feet of work. Mine equipment consists of cars, 60 h.p. boiler, steam hoist, five dwellings and assay office. Reduction equipment consists of 5-foot Huntington mill, driven by both gasoline and steam, three concentrators and 50-ton cyanide plant, leased to Barbarossa Mining Company. Property said to have produced $600,000. Idle since 1912. Barbarossa mine adjoins the Amalie on the north.

Bibl.: Reports XII, p. 141; XIII, p. 605.

American Golden Eagle, owned by Homer Bros., of Havilah, consists of 100 acres, in Secs. 2 and 10, T. 28 S., R. 32 E., M. D. M., in the Clear Creek mining district, 2 miles south of Havilah, in the Sequoia Forest Reserve. Claims formerly owned by American Golden Eagle Mining and Milling Company, of Los Angeles, who worked property for several years, then abandoned it. Relocated by Homer Brothers. Ore free on surface, but base with depth, carrying gold, silver and copper. Vein 8 feet wide with quartz-porphyry walls, strike northeast and southwest, dip 85° E. Workings consist of 100-foot shaft, 200-foot tunnel, drifts and stopes. Small producer. Ore shipped to smelter. Claims worked by owners. Adjoins McKidney prospect on the west.

Anatrosa is a prospect located in Sec. 13, T. 30 S., R. 32 E., M. D. M., 8 miles east of Caliente, in Amalie mining district, and in the Sequoia National Forest. Owned by Blodget et al., of Bakersfield. Leased to H. Williams. Vein is 30 feet wide, low grade. Small vein of high grade ore recently found in granite. Slightly developed with 200-foot tunnel and open cuts.

Arizona Group, consisting of 80 acres, is a small producer in the Rand mining district, 5 miles south of Randsburg, owned by Henry Bopp. Located in January, 1913. Small vein in schist. Sinking a shaft, at present 60 feet deep; gasoline hoist (8 h.p.) is used. Ore hauled to Red Dog custom mill. Twenty tons gave returns of $1520. Two men employed.

Baltic, a producer, in the Rand district, is located in Sec. 1, T. 20 S., R. 40 E., M. D. M., 1½ miles southeast of Johannesburg. Holdings consist of 40 acres (patented), owned by the Baltic Mining Company, of Randsburg; C. H. Wynn, president; H. R. Wynn, secretary and manager. Deposit consists of many small veins in a sheer zone of schistose quartz from 100 to 300 feet wide. Country rock is rhyolite and porphyry. Ore is free milling. Workings consist of two incline shafts, each 250 feet deep, levels, stopes, and 150 feet crosscut. Steam hoist is 20 h.p. Owners claim an ore reserve of 200,000 tons, assaying $2.50 per ton. Reduction equipment consists of 10-stamp Llewellyn mill, Blaker crusher (8″ x 10″), and 50-ton cyanide plant. Electric power used. Twenty men are employed. Adjoining mines are: G. B. on north, Gold Coin on south, Placer Gold Company on east and Bismarck on west.

Barbarossa Group, the largest producer in the Amalie mining district, is located in Sec. 29, T. 30 S., R. 33 E., M. D. M., about 15 miles northeast of Caliente, in the Sequoia Forest Reserve. This group, consisting of 140 acres, is owned by B. G. Parlow, of Loraine. Elevation at lower tunnel is 3600 feet. There are seven veins on the claim; only one however, the Barbarossa, has been worked. Strike of this vein is northwest and southeast, dip 40° E., average width 4 feet; granite footwall and quartz-porphyry hanging. Pay shoot is 200 feet long and 4 feet wide, free milling. Workings consist of several tunnels on the vein, drifts and stopes. Ore is hauled in wagons to Amalie mill, a distance of 1½ miles. Five men are employed. Property produced $4000 in June, 1914; total production, $60,000. Croppings on Gasonia claim are 1000 feet long and 40 feet wide, and carry some gold values. Pacific Light and Power Company's line runs through these claims.

Beauregard, one of the famous mines of the Cove district, is located in Sec. 28, T. 25 S., R. 33 E., M. D. M., in the Sequoia Forest Reserve, and ¾ of a mile north of Kernville. Elevation 3000 feet. This property consists of one claim (1200 feet long and 200 feet wide), making a total area of 6 acres, patented in 1882, and is owned by the Kern Development Company. C. S. Long, president; C. C. Hamilton, secretary; home office, Portland, Me.; local office, Kernville. Located in 1861, and acquired by present owners in 1907. There are two parallel veins on the claim, averaging 3 feet in width, strike S.

75° W., dip vertical; granite walls. Pay shoot is 1200 feet long and 3 feet wide, and has been worked for this distance. Workings consist of seven shafts from 100 to 300 feet deep, three levels, 2300 feet of drifts, and six stopes. Ore treated in 10-stamp mill, operated by water power from Kern River. Ditch is 2¼ miles long. Production to date, $600,000. Worked at one time by leasers. Ore is very free and plates $35 per ton. Some high grade found at times. Adjoining mines: Minnie E. on north and west, Urbana on south and North Extension Sumner on east.

Bella Rufin, formerly known as the Berry, is located in Sec. 25, T. 29 S. R. 33 E., M. D. M., in the Green Mountain district, about 23 miles northwest of Caliente. Elevation 3000 feet. Holdings consist of 40 acres, in Sequoia Forest Reserve, at an elevation of 3000 feet. Owned by J. E. Miller; leased to E. Peterson, Piute post office. Vein is 4 feet wide, strike southeast and northwest, dip vertical; granite walls. Pay ore occurs in pockets. Workings consist of shaft 120 feet deep, short drifts and one stope. Old 12-foot steam arrastra, horse-whim and cabin on property. Small producer. Total production about $15,000. Prospect. Mentioned in Report XII, p. 142.

Photo No. 7. Flashlight photo, showing ore in Big Blue Mine, 240-foot level.

Big Blue, owned by the Kern Development Company. C. S. Long, president and manager. Was one of California's famous gold producers in the '70s (see photo No. 7). The holdings, consisting of 12 acres patented in 1872, are located in Sec. 28, T. 25 S., R. 33 E.,

M. D. M., in the Cove mining district, about ½ mile north of Kernville, in the Sequoia Forest Reserve. Elevation 2900 feet. Three parallel veins known as East, West and Middle, which have an average width of 44 feet, strike N. 20° W., and dip 70° W. West vein pay shoot is 1500 feet long and 44 feet wide. Workings consist of four shafts, designated as Pierson, Engine, Donkey and Adit, maximum depth being 400 feet, five levels, over a mile of drifts, several stopes, three tunnels, the adit having a length of 2100 feet, and drains the Big Blue at a depth of 270 feet, another the Blue Gouge is 1057 feet long. Mine equipment consists of hoist, shops and office. Ore is reduced in 10-stamp mill on Kern River. Two men working at present. Property has produced $2,000,000. Some of the ore runs over $300 per ton in free gold. Adjoining mines: Sumner on north, Oriana and Blue Gouge No. 2 on west, Content on south, Juniper on east.

Bibl.: Reports VIII, p. 315; XIII, p. 191.; U. S. Comm. of Mineral Statistics, Raymond, 1875.

Black Hawk Group, consists of 130 acres, in the Rand district, 2½ miles southwest of Johannesburg. Owner, D. A. Blue, of Randsburg. Three veins, designated as South, North and Gray Eagle. Workings consist of four shafts, from 70 to 130 feet deep, and 4000 feet of drifts. Country rock is schist. Mine equipment consists of two horse-whims, blacksmith shop and cabins. A 5-stamp mill on Black Hawk claim constitutes the reduction equipment. Water obtained from Randsburg Water Company, through 3 miles of 1-inch pipe. Three men employed. Placer deposits on Gray Eagle, One and Two Track claims, which owner states runs $6 per ton in free gold and $2.50 in tungsten. Small producer.

Blue Gouge Group, consisting of 350 acres, is located in Secs. 28 and 33, T. 25 S., R. 33 E., M. D. M., in the Cove mining district, 2 miles north of Kernville in the Sequoia Forest Reserve. Elevation 3600 feet. Owners, Orejana Mining Company; C. S. Long, president and manager; C. C. Hamilton, secretary; home office, Hayward. Eight parallel veins on the claims, average width 5 feet (small veins), strike northwest and southeast, dip 68° N.; granite walls. The large lode (east vein) is from 100 to 500 feet wide, low grade. Workings consist of crosscut tunnel 1057 feet long, shaft 200 feet deep, one stope, and several open cuts. High grade ore on the S. F. Belle, from which $75,000 in gold has been extracted. The Red Top, Blue Gouge, and Lynx claims contact with the Content and Nellie Dent ore bodies, forming a width of 500 feet of low-grade ore that can be worked as an open cut. This, owing to its abrupt elevation and being only 2000 feet from the Kern River, could be handled by gravity to a mill conveniently located so as to take advantage of the cheap power which is abundant.

Bright Star, a noted mine of the Green Mountain district, located in Sec. 10, T. 28 S., R. 34 E., M. D. M., 34 miles northeast of Caliente, in Sequoia Forest Reserve, is owned by Mrs. Tracy et al., of San Francisco. Elevation at shaft 8400 feet. Holdings consist of 60 acres, patented, located some forty-five years ago. The vein has an average width of 20 inches, strike northeast and southwest, dip 60° N., slate walls. Pay shoot about 120 feet long and 20 inches wide, high grade ore. Workings consist of a shaft 540 feet deep, three levels, several thousand feet of drifts and stopes. The ore was treated in a 5-foot Huntington and 3-stamp mills, now removed from property. The Denver Gold and Silver Extraction Company worked the tailings with a 50-ton cyanide plant with good results. Production record said to be $600,000. Idle for several years. Collar Button, a prospect, adjoins property on west.

Bright Star, a prospect in the Woody mining district, was a small producer a few years ago. It is in Sec. 12, T. 25 S, R. 29 E., M. D. M., about 41 miles northeast of Bakersfield. Owner, E. A. James. Two parallel veins, having a width of 2 feet, strike E. and W., dip 30° S.; short pay shoot. Workings consist of tunnel on vein 600 feet long, and 800 feet of drifts. Idle.

Bull Run, another famous producer of the Cove mining district, consisting of 5.67 acres, patented in 1884, is located in Sec. 28, T. 25 S., R. 33 E., M. D. M., about $\frac{1}{2}$ mile north of Kernville in the Sequoia Forest Reserve. Elevation 2980 feet. Owners, Lady Belle Company; Dr. R. P. Schupphaus, president; C. C. Hamilton, secretary; home office, Portland, Maine; local office, Kernville. Vein is 2 feet wide, strike northeast and southwest, dip 70° N. Pay shoot is 900 feet long and 2 feet wide, free milling, rich sulphurets. Workings consist of main shaft 360 feet deep, seven levels, several thousand feet of drifts and crosscuts, and one stope 900 feet long. Mine equipment consists of hoisting plant, shop and office. Production to date $450,000. In 1893 J. B. Medina, a former lessee, mined from the north end of this property (at a depth of 80 feet), 100 tons of ore that gave returns of $150 per ton on the plates and $400 per ton from the concentrates.

Bibl.: Report VIII, p. 321.

Caldwell, a prospect, is located in Sec. 18, T. 26 S., R. 33 E., M. D. M., in the Keyes district, about 1½ miles northeast of Isabella, in the Sequoia Forest Reserve, comprising 20 acres, owned by A. R. Kiester. Vein is 6 inches wide, high grade ore. Workings consist of tunnel on vein 620 feet long, and short drifts. Formation is granite and slate.

Chief, prospect, in the Long Tom district, in Sec. 22, T. 27 S., R. 29 E., M. D. M., about 21 miles northeast of Bakersfield, owned by D. M. Tressel. Consists of 60 acres, elevation 2100 feet. Small vein in granite. Workings consist of two tunnels on vein, being 120 and 380 feet in length, and short drifts. A little high grade ore extracted by leasers.

Collar Button, prospect, is located in Sec. 10, T. 28 S., R. 34 E., M. D. M., in the Green Mountain district, about 34 miles northeast of Caliente, in the Sequoia Forest Reserve. Elevation 8100 feet. Owner, W. B. Grant, of Piute post office. Holdings consist of 14 acres. Vein is 2 feet wide, in slate. Extent of pay shoot not determined. Shaft 60 feet deep, shows 2 feet of ore that runs $40 per ton. Bright Star adjoins claim on east.

Commonwealth, owned by the Kern Development Company. C. S. Long, president and manager. Consists of 32.4 acres, patented, in Sec. 15, T. 25 S., R. 33 E., M. D. M., in the Cove district, about ½ mile north of Kernville in the Sequoia Forest Reserve; elevation 3000 feet. Four parallel veins in slate and granite, average width 4 feet. Only slightly developed with shallow shaft and open cuts. Surface ore mills $15 per ton.

Crystal, formerly known as the Bonanza, is a prospect in the Clear Creek district, in Sec. 2, T. 29 S., R. 31 E., M. D. M., about 22 miles north of Caliente in the Sequoia Forest Reserve. Holdings consist of 60 acres, owned by A. R. Cox. Elevation 2500 feet. Vein is 10 inches wide, in granite. Slightly developed with 120-foot shaft. Small pocket taken out in May, 1914.

Dead River Channel (placer), consists of 40 acres of placer ground in Sec. 17, T. 26 S., R. 33 E., M. D. M., in the Keyes mining district, about 1½ miles north of Isabella, at an elevation of 2500 feet. Owner, C. E. Barton. Course of channel is north and south, depth of gravel 10 feet. Granite bedrock. Water obtained from Kern River. Small producer.

Deer Hunter, is a prospect in the Amalie district, Sec. 20, T. 30 S., R. 34 E., M. D. M., about 18 miles northeast of Caliente, in the Sequoia Forest Reserve, at an elevation of 4100 feet. Owner, M. D. Elliott. Holdings consist of 60 acres. Small vein, in granite and schist. Slightly developed with short tunnel and drifts. Little high grade extracted.

Double Standard, owned by the Mojave Mining and Milling Company, of Los Angeles; G. E. Benton, president; B. Wagemann, watchman. Consists of 40 acres in Sec. 5, T. 10 N., R. 12 W., S. B. M., in the Mojave district, 3 miles south of Mojave. Elevation 2700 feet. Vein is 5 feet wide, strike northeast and southwest, dip 40° W Quartz-porphyry walls, ore free milling. Workings consist of shaft

200 feet deep, two levels, and 2000 feet of drifts and stopes. Mine equipment consists of steam hoist, cars, tools, assay office, dwellings. Reduction equipment consists of 5-stamp mill (1100-pound stamps), operated by steam power. Idle. Two men employed. Property has been a producer.

Dreadnot, formerly known as Hardtack, consists of 80 acres in Secs. 11, 12 and 14, T. 25 S., R. 29 E., M. D. M., about 40 miles northeast of Bakersfield in the Woody mining district. Owners, Blue Mountain Mining Company, of San Jose; E. Wolf, president. Two parallel veins known as Dreadnot and Grizzly, strike east and west, dip 45° N., width 2 feet, free milling. Workings consist of a shaft 220 feet deep, three levels, 400 feet of drifts and one stope. Mine equipment consists of steam hoist, cars, tools and dwellings. Reduction equipment consists of 5-stamp mill and two Frue concentrators. Property is idle.

Bibl.: Report XII, p. 143.

Early Sunrise, a prospect, owned by the Early Sunrise Mining and Milling Company, of Santa Ana; W. W. Holesworth, president; W. A. Penrol, secretary. Consists of 60 acres, in Sec. 26, T. 26 S., R. 32 E., M. D. M., in the Keyes district, about 3 miles south of Isabella, in Sequoia Forest Reserve. Elevation 3600 feet. Small vein, in granite. Slightly developed with short tunnel, 430 feet long, and a few hundred feet of drifts. A little high grade found. Idle.

Eclipse No. 1, a prospect in the Woody mining district. Owned by D. Engle et al., is located in Sec. 34, T. 25 S., R. 29 E., M. D. M., ½ mile north of Woody. Elevation 2000 feet. Holdings consist of 20 acres. Vein is 1 foot wide, granite walls, ore free milling on the surface, but base with depth. Slightly developed with shaft 70 feet deep and a tunnel 80 feet long, and short drifts. Ore was worked in a Huntington mill (now removed), and gave returns of $40 per ton on plates. Said to have produced $20,000. Idle.

Elephant Group, consists of 100 acres, in the Mojave mining district, in Sec. 6, T. 10 N., R. 12 W., S. B. M., about 5 miles south of Mojave, at an elevation of 3900 feet. Owner, D. E. Baker, of Nordhoff; B. Fisher, superintendent. The vein is 7 feet wide, 3 feet in bottom of shaft, said to run $200 per ton in gold, strike northwest and southeast, dip 60° N., granite-porphyry walls. Workings consist of a shaft 100 feet deep, short drifts, and one stope 120 feet long. Mine equipment consists of windlass, cars, tools, shop and cabin. Three men employed. Ore shipped to Selby's smelter, total cost (smelter charges, freight, mining, etc.) is $10 per ton for ore assaying $50 per ton. Small producer.

Ella Group, a prospect located in May, 1914, in the Amalie mining district, in Sec. 29, T. 30 S., R. 33 E., M. D. M., 15 miles northeast of Caliente, is owned by Rainey Brothers of Loraine. Group consists of 40 acres. Elevation 4000 feet. Vein 2 feet wide, runs $40 per ton in free gold, granite footwall and rhyolite hanging. Slightly developed with shaft 55 feet deep and a short drift. Three owners working. Forty tons of ore on dump.

Ellston, formerly known as Producer, is a prospect, in the Clear Creek mining district, in Sec. 8, T. 29 S., R. 31 E., M. D. M., 20 miles north of Caliente, in the Sequoia Forest Reserve. Owner, R. E. Ellston. Holdings consist of 55 acres, at an elevation of 3200 feet. Pay ore occurs in pockets in granite. Slightly developed with shaft 80 feet deep and short drifts. Ore worked in 12-foot arrastra, power obtained from Clear Creek. Two men employed. Some rich ore extracted.

Excelsior, prospect, in Mojave mining district, in Sec. 6, T. 10 N., R. 12 W., S. B. M., about 3½ miles south of Mojave. Owned by Hunter, Clark and Ischinger of Mojave. Holdings consist of 20 acres, at an elevation of 2800 feet. Vein 2 feet wide, quartz-porphyry walls. Workings consist of three shafts on vein, from 60 to 150 feet deep. Idle.

Exposed Treasure (see *Mojave Consolidated*).

Fair View, consists of 80 acres in Sec. 11, T. 9 N., R. 13 W., S. B. M., about 4 miles northwest of Rosamond Station. Owners, Pierce & Company, of Los Angeles. Elevation 2650 feet. Vein 2 feet wide, granite-porphyry walls. Workings consist of shaft 400 feet deep, four levels, 1500 feet of drifts and a stope 130 feet long. There is a gasoline hoist, and dwellings on the property. Reduction equipment consists of 10-stamp mill and 50-ton cyanide plant, operated by steam power. Idle since 1911.

Garnishee, prospect, consists of 40 acres in Sec. 35, T. 26 S., R. 32 E., M. D. M., in the Keyes mining district, about 3 miles south of Isabella, at an elevation of 3200 feet. Owner, H. Stavert. Vein is small, the pay ore occurring in bunches in granite. Workings consist of tunnel 460 feet long and 2000 feet of drifts. Some rich ore extracted a few years ago. Idle.

G. B., consisting of 22.5 acres, is located in Sec. 1, T. 30 S., R. 41 E., M. D. M., 1¼ miles southwest of Johannesburg, at an elevation of 3600 feet. Owners, G. B. Mining and Reduction Company of Randsburg. C. G. Illingworth, president; G. L. Caulfield, manager; J. MacFarlane, superintendent. The holdings consist of 22.5 acres. The deposit consists of a shear zone from 100 to 300 feet wide, containing numerous parallel ledges, in rhyolite. Ledges have a width of from

10 to 18 feet, strike N. 10° E., dip 30° to 50° E. Ore is free milling. Workings consist of four shafts from 150 to 260 feet deep, two levels, 1000 feet of drifts, crosscuts, raises, winzes, and a stope 700 feet long. Ore reserve 10,000 tons, of a value of $5 per ton. Caving system of mining used. Mine equipment consists of 10 h.p gasoline hoist, cars, tools, electric motor for blower, buildings, and electric lights in mine. Reduction plant consists of dry crushing mill equipped with two crushers, rolls and screens, run by 50 h.p. motor. Capacity of mill 60 tons in twenty-four hours; also cyanide plant consisting of ten tanks of 8 tons capacity each (experimental plant). Electric power costs 12 cents per ton. Total operating cost $3 per ton. Six men employed. Worked until 1910 by leasers, who extracted some good milling ore. Some of the sulphides run $3000 per ton in gold. Adjoining mines, Baltic on south and Yellow Astor on west.

Glen Olive, the largest producer in the Pioneer mining district, consists of 120 acres in Sec. 33, T. 27 S., R. 33 E., M. D. M., 42 miles north of Caliente, in the Sequoia Forest Reserve. Elevation at tunnel, 7500 feet. Owners, A. W. Stetson et al., San Francisco; F. A. Braden, superintendent. Two parallel veins, about 200 feet apart, known as Bulgarian Troubles and Russian Bear; average width 3 feet; strike northwest and southeast, dip N. 15° W. Ore free milling, giving returns of $25 per ton on the plates. Pay shoot about 200 feet long. Workings consist of two tunnels on vein 200 feet apart and each 700 feet long, several hundred feet of drifts, crosscut 320 feet long, raises, three winzes 100 feet deep. all stoped between tunnels. Mine is equipped with cars, 800 feet automatic tramway (use two cars), shops, assay office, and dwellings. Reduction equipment consists of 10-stamp Hendy mill (1000-pound stamps) driven by gasoline, which costs 12 cents per gallon. Water obtained from springs. Tailings impounded in gulch. Production to date, $500,000. Mine closed down in May, 1914, on account of general financial conditions, as the crosscut tunnel must be extended to cut the vein so as to block out ore.

Gold Crown Consolidated, formerly known as Gold King Group, consisting of 46 acres, patented, is located in Secs. 11 and 12, T. 30 S., R. 40 E., M. D. M., 2½ miles south of Johannesburg in the Stringer mining district, at an elevation of 4000 feet. Owner, H. W. Mauby, of Randsburg. Several veins from 5 to 20 feet wide in schist. Worked by means of shallow shafts and open cuts. Ore treated at Red Dog custom mill. Cost of hauling and milling is $5.50 per ton. Net profit per ton $20. Two men employed. Small producer.

Golden Group, formerly known as Jack Rabbit, consisting of 100 acres, is located in Sec. 34, T. 30 S., R. 32 E., M. D. M., in the Amalie district, 8 miles east of Caliente, in the Sequoia Forest Reserve. Elevation 2000 feet. Owner, J. B. Ferris, of Caliente. The deposit is massive, the average width of pay ore being 20 feet, low grade, strike northwest and southeast, dip 45° N., granite walls. Workings consist of shaft 200 feet deep, three levels, 300 feet of drifts and stopes. Reduction equipment consists of Marathon tube mill (6 feet long and 3 feet diameter), operated by 24-foot overshot water wheel (see photo No. 8). Water from Caliente Creek through 10-inch pipe, 1000 feet long. Total production to date $5,000. Four men employed. Owner claims large ore reserve.

Photo No. 8. Water wheel operating "Marathon" tube mill, Golden Group.

Gold Peak, formerly known as the Zada, one of the producers of the Amalie mining district, is located in Sec. 28, T. 30 S., R. 33 E., M. D. M., 14 miles northeast of Caliente, in the Sequoia Forest Reserve. Holdings consist of 340 acres, patented. Owned by Gold Peak Mining Company, of San Francisco; H. H. Blood, president; F. Kramer, secretary. Bonded to Coulson Bros., of Los Angeles. Six veins; only one, the Zada, has been worked. Average width 10 feet, strike northwest and southeast, dip 40° E., quartz-porphyry walls. Pay shoot 300 feet long and 10 feet wide. Ore as a rule is free milling, but one vein carries base metals, being rich in sulphides of copper and silver. Workings consist of tunnel 450 feet long and several thousand feet of drifts and stopes. Mine equipment consists of machine drills, compressor plant, cars, ore bins, dwellings and assay office. Reduction plant consists of 20-stamp Hendy mill and four Frue concentrators, operated with gasoline engine. Idle. Tailings are impounded. Over $100,000 worth of ore shipped to smelter before mill was erected. Three men employed.

Gold State Group, a prospect, is located in Sec. 9, T. 29 S., R. 34 E., M. D. M., in the Green Mountain district, about 31 miles east of Caliente, at an elevation of 7300 feet. Owners, M. J. Errecart et al., of Loraine post office. Holdings consist of 100 acres, reached by a 7-mile trail from Piute post office. Vein is 10 inches wide, granite footwall and slate hanging. Slightly developed with shaft 80 feet deep, 200 feet of drifts, and one stope 80 feet long. Reduction plant consists of an old 12-foot arrastra, operated by steam power, wood being used as fuel. One man employed. Some high grade ore extracted. Total production $20,000.

Good Hope, formerly known as Good Hope and Kenyon, owned by Consolidated Mines Company, of Los Angeles; W. H. Herren, president; S. H. Ellis, secretary; Robert Lanka, superintendent. Consists of 156 acres (patented) in Sec. 35, T. 29 S., R. 40 E., M. D. M., 1 mile west of Johannesburg in the Rand mining district. Elevation 3550 feet. Two veins, Good Hope and Butte, strike east and west, dip 56° S., diorite walls, average width 20 inches. Pay shoot 300 feet long and 20 inches wide. Ore free milling. Workings consist of shaft 300 feet deep, five levels, and several thousand feet of drifts, raises, winzes and stopes. Mine equipment consists of 15 h.p. gasoline hoist, shop, ore bins, and dwellings. Reduction equipment consists of 5-stamp Union Iron Works mill, Blake rock crusher, settling tanks, and 30 h.p. motor, all operated with gasoline costing 25¢ per gallon. Water obtained from wells at Johannesburg. Tailings impounded to be cyanided at some future time. Eleven men employed. Cost (per ton): development $2, mining $2, treatment $1, general 50¢, making a total of $5.50. Adjoining mines: Yellow Astor, Big Butte, Little Butte and King Solomon.

Good Luck, a prospect, consists of 40 acres in Sec. 16, T. 27 S., R. 29 E., M. D. M., in the Long Tom mining district, about 21 miles northeast of Bakersfield, owned by A. P. Tucker, of Tulare. Elevation 1750 feet. Vein is small in granite, but rich. Pay shoot short. Slightly developed with tunnel 420 feet long, 200 feet of drifts, and a stope 40 feet long. Ore worked in 12-foot arrastra, driven by water power from Long Tom Creek. One man working.

Bibl.: Report XII, p. 191.

Grace Group, a prospect in the Mojave mining district, consists of 120 acres in Sec. 6, T. 10 N., R. 12 W., S. B. M., 4½ miles south of Mojave, at an elevation of 3400 feet. Vein is 20 inches wide, strike northwest and southeast, dip 60° N., granite-porphyry walls. Slightly developed with tunnel 450 feet long. Originally part of Karma group. Little high grade ore found. Adjoining mine: Queen Esther on the west.

Grey Eagle, formerly known as Echo, consists of 100 acres, patented, in Sec. 6, T. 10 N., R. 12 W., S. B. M., 4 miles south of Mojave, in the Mojave district, at an elevation of 3500 feet. Owner, A. Asher, of Mojave. Vein is 15′ wide, strike northwest and southeast, dip 50° W., granite-porphyry walls. Pay shoot is 240 feet long and 15 feet wide, low grade, with rich ore on footwall side; free milling. Workings consist of shaft 350 feet deep, three levels, 3000 feet of drifts and one stope 240 feet long. Old steam hoist, assay office and dwellings on the property. The former owners, Echo Mining Company, worked the ore in a 10-stamp mill which was removed in 1906. Owner claims a production record of $200,000. Idle since 1905.

Iconoclast, prospect, in the Valley View mining district, in Sec. 25, T. 27 S., R. 33 E., M. D. M., about 36 miles north of Caliente, consists of 60 acres, in the Sequoia Forest Reserve, owned by R. E. Porter. Elevation 8000 feet. Vein is 2 feet wide, free milling, granite footwall and slate hanging. Slightly developed with tunnel on vein 360 feet long. A little high grade ore extracted. Ore on dump said to run $30 per ton. One man employed.

Bibl.: Report XIII, p. 186.

Illinois and Golden Bell, prospect, in Pioneer mining district in Sec. 16, T. 27 S., R. 33 E., M. D. M., about 40 miles north of Caliente in Sequoia Forest Reserve, owned by J. Peep, of Bodfish P. O. Elevation 7800 feet. Holdings consist of 60 acres. Vein is 12 inches wide, slate footwall and granite hanging, free milling. Slightly developed with tunnel 310 feet long on vein. Worked as a pocket mine and $12,000 in gold said to have been extracted.

Indian Queen, a prospect, consisting of 40 acres, is located in Sec. 15, T. 27 S., R. 29 E., M. D. M., 22 miles northeast of Bakersfield, in the Long Tom mining district. Owner, R. E. Dosworth, of Tulare. Small vein, granite footwall, and diabase hanging. Workings consist of tunnel 80 feet long and short drifts. A little rich ore found.

Jeff Davis, one of the early producers of the Cove mining district, consists of 5 acres (patented in 1884) in Sec. 28, T. 25 S., R. 33 E., M. D. M., about ½ mile north of Kernville, in the Sequoia Forest Reserve, at an elevation of 2900 feet. Owners, Lady Belle Company, of Portland, Maine; president, Dr. R. C. Schupphaus; secretary, C. C. Hamilton; manager, C. S. Long, Kernville. Vein is 12 inches wide, granite walls, strike east and west, dip 70° N. Pay shoot is 350 feet long, and 12 inches wide, free milling ore, high grade. Workings consist of shaft 200 feet deep, one level, several hundred feet of drifts and a stope (350′ by 3′ by 150′). Ore stoped out from the level (150 feet), to the surface by leasers during the sixties. Production to date, $150,000. Adjoining mines: Orejana on south, Lady Belle on west, Bull Run on north, Summer on east.

Jennette, the largest producer in the Green Mountain mining district, consists of 40 acres in Sec. 22, T. 29 S., R. 34 E., M. D. M., about 25 miles northeast of Caliente, in the Sequoia Forest Reserve. Elevation 8000 feet. Owner, J. Lombard, of Piute post office. The vein has an average width of 6 inches, free milling, high grade ore, strike northeast and southwest, dip 40° S., granite walls. Workings consist of several tunnels on the vein, from 50 to 400 feet long, 2500 feet of drifts and stopes. Reduction equipment consists of 4-stamp mill, operated with steam power, wood being used for fuel. Seven men employed. Yearly production from $15,000 to $20,000. Ore runs $40 per ton. Adjoining mine: Gwinn to west.

Josephine Group, a consolidation of several old properties in the Woody mining district, consists of 150 acres, patented, and 150 acres held by location, in Secs. 2, 3, 4, 5 and 8, T. 25 S., R. 29 E., M. D. M., about 5 miles southeast of White River post office. Owner, W. Adams, of Corinth, Miss. Elevation 4000 feet. The claims included in this group are Josephine, Ballard, Last Chance, Mountain View, Banner, Alta, Queen, Vulture (patented), and Missouri, Yankee and Perseverance groups. Six parallel veins, average width 2 feet, strike east and west, dip 45° E., quartz-porphyry footwall and slate hanging, free milling ore. Main workings are on the Josephine and consist of a tunnel 300 feet long, 120-foot crosscut, 1000 feet of drifts and a stope 80′ by 3′ by 70′. Several open cuts on other claims. Reduction equipment consists of a 5-foot Huntington mill run by steam power, wood being used for fuel. One man employed. Josephine was a good producer some years ago.

Bibl.: Reports XII, p. 145; and XIII, p. 191.

Josephine T. G. Group, consists of 70 acres in the Rand district, 2 miles southwest of Randsburg, and adjoining the Yellow Aster mine on the southwest. Owner, J. P. Howe, of Randsburg. Elevation 4000 feet. Deposit consists of quartz fissures in schist. Workings consist of several shafts from 20 to 150 feet deep, 400-foot crosscut, and a number of open cuts. Ore is free milling and shipped to Red Dog custom mill. Total operating cost, including milling, about $20 per ton. Equipment consists of 8 h.p. gasoline hoist, skids, buckets, cars and tools. Three men employed. Production to date $11,500.

Karma, owned by the Karma Mining Company, of San Francisco, R. Trost, president, E. L. Wigman, superintendent. Consists of 30 acres in Sec. 6, T. 10 N., R. 12 W., S. B. M., about 4 miles south of Mojave, in the Mojave district, at an elevation of 3200 feet. Two parallel veins, average width 15 feet, strike north and south, dip 60° E., granite-porphyry walls. Pay shoot 240 feet long and 15 inches wide. Ore free milling, needs fine grinding. Workings consist of a tunnel 1800 feet long on vein, shaft 160 feet deep, drifts and stope 240 feet long. Mine equipment consists of cars, steam hoist, assay office, shops, ore bins and dwellings. Ore reduced in a 20-stamp mill, steam driven. Idle. Water obtained from Soledad Pipe Line Company. Three men employed. Property only worked to a limited extent since 1904. Said to have produced $300,000. Adjoins Double Standard mine on the west.

Kern County Consolidated Gold Mines, formerly known as Gwynne, a small producer in the Green Mountain district, is located in Sec. 22, T. 29 S., R. 34 E., M. D. M., about 25 miles northeast of Caliente, in the Sequoia Forest Reserve. Owners, Kern County Consolidated Gold Mines Company. F. W. Gwynne, president, J. Ross, superintendent, Piute post office. Holdings consist of 40 acres, patented, at an elevation of 7500 feet. Vein has an average width of 14 inches, strike northeast and southwest, dip 40° S. Short pay shoot, free milling. Workings consist of a shaft 300 feet deep, three levels, several hundred feet of drifts, stopes and a tunnel on the vein 1500 feet long. Mine equipment consists of 30 h.p. steam hoist, cars, skip, shop and dwellings. The ore is reduced in a 3-stamp Hendy mill (850-pound stamps), operated with steam power, wood being used for fuel. Some rich ore mined. Five men employed. It adjoins the Jennette mine on the east.

Keyes, formerly known as the Old Keyes, located in 1852 by Colonel Keyes, is one of the famous mines of Kern County. The holdings consist of 100 acres in Sec. 26, T. 26 S., R. 32 E., M. D. M., in Keyes district, about 3 miles southeast of Isabella, in the Sequoia Forest Reserve, at an elevation of 3600 feet. Owners, Keyes Mining Company, of San Diego. J. L. Hooper, president, Geo. Stavent, superintendent. The vein (Keyes) is 2 feet wide, strike northeast and southwest, dip 70° E., granite walls, free milling, high grade. Workings consist of several thousand feet of tunnels, drifts and stopes. Maximum depth about 450 feet. Mine equipment consists of cars, shops, assay office and dwellings. Ore is reduced in a new 5-stamp mill (1100-pound stamps), operated by distillate, costing about 8¢ per gallon. Nine men employed. Producer.

Bibl.: Reports XII, p. 145; and XIII, p. 191. U. S. G. S., Mineral Resources of U. S.

Keysville Placer, consists of 40 acres in Sec. 36, T. 26 S., R. 32 E., M. D. M., about 3 miles southeast of Isabella, in the Sequoia Forest Reserve, owned by G. Henschkel. Elevation 3400 feet. Old river deposit, worked in winter by ground sluicing. Course of channel northwest and southeast, granite bedrock, pay gravel 5 to 10 feet deep, easily worked, small producer.

King Solomon Consolidated Mines Company, consists of 90 acres, in Sec. 35, T. 29 S., R. 40 E., M. D. M., $\frac{3}{4}$ of a mile west of Johannesburg in the Rand district. Owners, King Solomon Consolidated Mines Company, of Los Angeles. E. Shipsey, president; J. Shipsey, superintendent. Elevation 3900 feet. Vein is 3 feet wide, granite footwall and porphyry hanging. Pay shoot said to be 1400 feet long, free milling. Workings consist of a shaft 520 feet deep, levels every 50 feet, 1400-foot drift and stopes. Mine equipment consists of a 20 h.p. West Coast hoist, cars and ore bin. Ore is reduced at Red Dog custom mill. Ten men employed. Adjoining mines, Butte and Gold Consolidated.

King Solomon Gold Mining Company, formerly known as the Pleasant View, the largest producer in the Clear Creek district, is owned by the King Solomon Gold Mining Company, of Los Angeles. B. Hohn, president; Mrs. J. Hayes, secretary. Leased to C. E. Benton. The holdings consist of 100 acres, in Secs. 9 and 10, T. 28 S., R. 33 E., M. D. M., about 4 miles east of Havilah, in the Sequoia Forest Reserve, at an elevation of 6500 feet. The vein is 3 feet wide, strike northeast and southwest, dip 60° S., granite walls. Pay shoot 300 feet long, free milling. Workings consist of a shaft 300 feet deep, three levels, short drifts, and one stope. Mine equipment consists of a steam hoist, two 30 h.p. boilers, cars, assay office, shop and dwellings. Ore is reduced in a 5-stamp Hendy mill (1000-pound stamps), operated with steam power, wood being used for fuel. Six men employed. Said to have produced $40,000 since 1912.

La Cross, a prospect, consists of 20 acres in the Stringer mining district in Sec. 2, T. 30 S., R. 40 E., about 1½ miles south of Randsburg, at an elevation of 4000 feet. Owner, H. Putnam, of Los Angeles. Vein is small, averaging 6 inches, high grade; albite schist forms the walls. Idle on account of litigation.

Lady Belle, one of the famous producers of the Cove district, consists of two full claims (the Lady Belle and Boston Belle, the former claim patented in 1884), located in Sec. 28, T. 25 S., R. 33 E., M. D. M., in the Sequoia Forest Reserve, and about ½ mile north of Kernville. Owners, Lady Belle Company, of Portland, Maine. Dr. R. C. Schupphaus, president; C. S. Long, manager, Kernville. Elevation 3100 feet. Lady Belle vein has a width of 3 feet, strike east and west, dip 65° N., granite walls. Pay shoot is 250 feet long and 3 feet wide, free milling. Property has been worked since 1861, and at one time supported a number of lessees as the ore is high grade and easily mined. The workings consist of a shaft 372 feet deep, four levels, several thousand feet of drifts and three stopes each 200 feet long. Ore reserves 4000 tons, value $35 per ton. The mine equipment consists of steam hoist, two Cameron pumps, assay office, ore bins and cars. Ore reduced at the 10-stamp mill on Kern River. Total cost of mining and milling at present is about $5 per ton. Three men employed. One run of 1500 tons of ore gave $40 on the plates. Production to date about $500,000. Adjoining mines: Big Hill, Pinnacle, and Penn cut on south, Jeff Davis and Bull Run on east, S. F. Belle and Frank on north.

Lida, also known as the Hamilton, consists of 180 acres in Sec. 11, T. 9 N., R. 13 W., S. B. M., about 5 miles northwest of Rosamond, at an elevation of 2800 feet. Owners, Milwaukee Mining Company, of Milwaukee, Wis.; C. H. Watkins, president and manager; Geo. Bert, superintendent. The vein is 2 feet wide, granite footwall and slate hanging, strike northeast and southwest, dip 25° S., free milling. Workings consist of a shaft 320 feet deep, three levels, 2000 feet of drifts, and a stope 200 feet long. Mine equipment consists of steam hoist, cars, assay office, ore bin, shops and dwellings. Oil is used for fuel. A 10-stamp mill (1000-pound stamps), and a 25-ton cyanide plant comprise the reduction equipment. Water obtained from springs. Six men employed. Property said to have a production record of $200,000. Small producer at present.

Little Angel, formerly known as Warrington, consists of 40 acres, in Clear Creek district in Sec. 2, T. 28 S., R. 32 E., M. D. M., in Sequoia Forest Reserve, about 30 miles north of Caliente. Owner, S. C. Smith, of Havilah post office. Vein is small, but high grade. Short ore shoot in granite. Slightly developed with a tunnel 320 feet long on the vein, a 60-foot raise and one stope 80 feet long. Small producer some years ago.

Bibl.: Report XIII, p. 192.

Little Bonanza, a prospect in the Green Mountain mining district, in Sec. 35, T. 26 S., R. 32 E., M. D. M., about 5 miles south of Isabella, in the Sequoia Forest Reserve, consists of 20 acres. Elevation 4100 feet. Owner, A. R. Lucy, of Isabella. Small vein in slate and granite. A tunnel 140 feet long on vein and short drifts comprise the development work. Worked as a pocket mine. Adjoins the Mammoth mine on the west.

Bibl.: Report XII, p. 191.

Little Butte, consists of 60 acres in the Rand district in Sec. 35, T. 29 S., R. 40 E., M. D. M., about 1 mile west of Johannesburg, at an elevation of 3600 feet. Owners, Little Butte Mining and Milling Company, of Los Angeles; C. W. Clark, president; Dr. J. W. Oakley, secretary; R. F. Dickinson, superintendent. Vein 4 feet wide, free milling, diorite footwall and porphyry hanging. Workings consist of a shaft 610 feet deep and 3500 feet of drifts. Equipment consists of 25 h.p. gasoline hoist, skip, cars and 2-stamp mill. Distillate, costing 20¢ per gallon, used for fuel. Ore shipped to Red Dog custom mill. Worked since 1907 by lessees. A production record of $150,000 is claimed.

Long Tom, consisting of 120 acres, patented, was the first discovery in the Long Tom mining district, and the largest producer. This group is located in Sec. 21, T. 27 S., R. 29 E., about 20 miles northeast of Bakersfield, at an elevation of 1600 feet. Owner, H. Herschfeld, of Bakersfield. The vein has a width of 16 inches, strike northwest and southeast, dip 45° N., diabase footwall and granite hanging, free milling. Workings consist of a shaft 380 feet deep (sunk at an angle of 45°), several thousand feet of drifts, and stopes 150 feet long. All ore has been stoped from the 300-foot level to the surface. Equipment consists of dwellings and 20-stamp mill (850-pound stamps). Idle. Property was a noted producer some years ago but is now only worked to a limited extent. Some of the old workings are caved. Two men employed.

Bibl.: Report XI, p. 238.

Mammoth, also known as the Harrison, is the largest mine in the Keyes district, and has been in operation over sixty years. This group, consisting of 100 acres, is located in Sec. 35, T. 26 S., R. 32 E., M. D. M., about 5 miles south of Isabella, in the Sequoia Forest Reserve, at an elevation of 3900 feet. Owners, Mammoth Mountain Mining Company, of Los Angeles; H. M. Russell, president; A. G. Keating, manager. The Mammoth vein is 2 feet wide, strike northeast and southwest, dip 70° E., slate footwall and granite hanging, free milling ore. Workings consist of a tunnel on the vein 700 feet long, and several thousand feet of drifts, stopes, and raises. Mine equipment consists of cars, shops, assay office and dwellings. The ore is reduced in a 10-stamp mill (1100-pound stamps), driven by electric power from the Pacific Light and Power Company. Nine men employed. Producer.

Bibl.: Reports VIII, p. 314; and XIII, p. 193.

Mascot Group, 5 miles southwest of Randsburg, in the Rand mining district, consists of 60 acres. Owned by G. M. Humphrey, of Randsburg. Elevation, 3000 feet. Small vein of high grade ore in schist, free milling. Extent of ore body not determined. A shaft 50 feet deep and a short drift constitute the workings. Ore is reduced in Red Dog custom mill. Three men employed. Cost of mining and milling, about $20 per ton. Ore plates from $50 to $75 per ton.

McKidney, consisting of 60 acres, in Sec. 9, T. 28 S., R. 32 E., M. D. M., about 28 miles north of Caliente, in the Sequoia Forest Reserve, is a small producer in the Clear Creek district. Elevation, 4300 feet. Owner, D. Fergusin, of Havilah post office. Three parallel veins, but only one, the McKidney, has been worked. Average width, 2 feet, strike northeast and southwest, dip 78° S., syenite footwall and granite hanging. Ore free milling and runs from $20 to $100 per ton in free gold. Workings consist of a shaft on vein 230 feet deep, two levels and 1000 feet of drifts and stopes. Mine equipment consists of a gasoline hoist, two engines (10 and 20 h.p.) one Burleigh drill, compressor plant, tools and dwelling. Three men employed. Adjoining mine: American Golden Eagle on the west.

Bibl.: Report XIII, p. 193.

Minnehaha, a small producer of the Rand district, consists of 80 acres in Sec. 2, T. 29 S., R. 40 E., M. D. M., about 3 miles west of Johannesburg, at an elevation of 3800 feet. Owners, E. B. Maginnis et al., of Randsburg. Small vein, high grade ore, milling, $100 per ton. Workings consist of four tunnels, each 400 feet long, and four shafts each 100 feet deep. Ore reduced in Red Dog custom mill. Three men employed. Production to date, $35,000.

Minnie E. Group, consists of 40 acres, in Sec. 28, T. 25 S., R. 33 E., M. D. M., in the Cove district, about 1 mile north of Kernville, in the Sequoia Forest Reserve, at an elevation of 2950 feet. Owners, Lady Belle Company, of Portland, Me.; Dr. A. C. Schupphaus, president; C. S. Long, manager, Kernville. Prospect. Undeveloped.

Minnesota Group, formerly known as King George. A small producer of the Rand mining district, in Sec. 35, T. 29 S., R. 40 E., M. D. M., about 3 miles south of Randsburg, at an elevation of 4000 feet. Owner, D. Gunderson. Holdings consist of 50 acres located in 1896. Small vein in schist. Ore runs $68 per ton in free gold. Workings consist of three shafts, each 100 feet deep and short drifts. Mine equipment consists of horse-whim, car and dwelling. Ore reduced at Red Dog custom mill. Three men employed. Produced $10,000 to date. Adjoins Josephine group on the east.

Mojave Consolidated Gold Mines, formerly known as Exposed Treasure, the largest producer in the Mojave mining district, is located in Sec. 32, T. 11 N., R. 12 W., S. B. M., about 3½ miles south of Mojave, on south side of Soledad Butte. The holdings, consisting of 280 acres, patented, and 60 acres held by location, are owned by the Mojave Consolidated Gold Mines, of Los Angeles; C. B. Campbell, president; W. H. Taylor, secretary; C. F. Nourse, superintendent. Property acquired by present owners in 1912. There are six parallel veins on claims known as Mill, Assay Office, Golden Carrier, Yellow Rover, Boston and Exposed Treasure. These veins vary in width from 100 to 1000 feet, strike northwest and southeast, dip 30° E., granite footwall and quartz-porphyry hanging. Pay shoots 1500 feet long and 100 feet wide, free milling. Workings consist of several shafts on the vein, the deepest 900 feet, nine levels, over 2 miles of drift, crosscuts and stopes. One stope is 900 feet long on Exposed Treasure claim. Several hundred thousand tons of ore in sight. Ore showing free gold in bottom of 900-foot shaft on Exposed Treasure. Shrinkage stope method of mining used. Mine equipment consists of cars, compressor plant, machine drills, shops, assay office, ore bins, dwellings, 3½ miles of telephone line to Mojave, three steam hoists, several mine pumps and two Moreland

Photo No. 9. Mill at Mojave Consolidated Mine.

auto trucks. Reduction equipment consists of 20-stamp mill (1100-pound stamps) and a 60-ton cyanide plant (nine sand vats and three slime agitators) (see photo No. 9). Crude oil used as fuel. Water obtained from Soledad Pipe Line Company. Fifty men employed. Daily production, 60 tons. Production record to date about $2,000,000.

Bibl.: Transactions Am. Inst. Min. Engineers, Vol. XXXVII, pp. 168–176; XXXVIII, pp. 310–319.

Monarch Tungsten Gold Mining Company, a prospect in the Rand mining district, in Sec. 1, T. 30 S., R. 40 E., M. D. M., about 1½ miles south of Johannesburg, at an elevation of 3800 feet, consists of 50 acres, owned by W. A. Wise et al., of Los Angeles. Slightly developed with shallow shafts. Ore has not been found in place (gold and tungsten float). Joins Baltic on east. Idle.

Nellie Dent and Content, consists of 54.3 acres, patented in 1874, in Secs. 28 and 33, T. 25 S., R. 33 E., in Cove mining district, about ½ mile of Kernville, in the Sequoia Forest Reserve, at an elevation of 3100 feet. Owners, Kern Development Company of Portland, Maine. C. S. Long, president and manager, Kernville. Vein has an average width of 130 feet (low grade), between granite walls, strike S. 27° W., dip 68° W. Pay shoot on surface can be traced for 4200 feet by the croppings, free milling. Workings on Nellie Dent claim consist of a shaft 150 feet deep, a drift 450 feet long and one stope 450 feet in length, from which $100,000 was extracted. Report by C. W. Kempton states 1,000,000 tons of ore in sight on Content claim; also that 50 feet of ledge gave returns of $5 per ton in gold, and that deposit can be worked by open cut method of mining. Raymond, U. S. Commissioner of Mineral Statistics, in 1875, stated that "the vein on the Nellie Dent mine is 200 feet wide between walls, and carries ore yielding up to $10 or $12 per ton." Adjoining mines: Big Blue to north, Arroyo to northwest, Lyna and Blue Gouge No. 3 to northeast, and Maverick to southwest.

Old Cowboy, consists of 80 acres in Sec. 28, T. 30 S., R. 33 E., M. D. M., in Amalie District about 14 miles northeast of Caliente, in the Sequoia Forest Reserve, at an elevation of 2800 feet. Owner, A. E. Bryson, of Los Angeles. The vein has an average width of 12 feet, quartz-porphyry walls, strike northeast and southwest, dip S. 40° E. Pay shoot 230 feet long and 12 feet wide (3 feet paid to ship), free milling. Workings consist of tunnel on vein 520 feet long, and several hundred feet of drift and stopes. Worked at times by lessees who extracted about $60,000 worth of shipping ore. Idle at present. Adjoins Gold Peak mine on west.

Ophir, consists of 40 acres, patented, in Sec. 11, T. 28 S., R. 32 E., M. D. M., in the Clear Creek district, about 29 miles north of Caliente, in the Sequoia Forest Reserve, at an elevation of 4200 feet. Owner, J. E. Waters, of Havilah post office. Vein is 4 feet wide, slate walls. Development work consists of a tunnel on the vein 420 feet long, several shallow shafts, 600 feet of drifts and one stope 130 feet long. Ore worked years ago in 5-stamp mill, which has been removed to the King Solomon mine. Owner claims that property produced $90,000. Idle.

Bibl.: Report XIII, p. 194.

Oro Fino, one of the early producers of the Clear Creek mining district, consisting of 60 acres, patented, in Sec. 3, T. 28 S., R. 32 E., M. D. M., about 30 miles north of Caliente, in the Sequoia Forest Reserve, is owned by J. A. Bouquet, of San Francisco. The vein is 4 feet wide, granite walls, strike northeast and southwest, dip 72° E. Workings consist of a tunnel on the vein 230 feet long and several hundred feet of drifts and stopes. Ore was milled in the custom mill at Havilah, now removed. Property said to have produced $100,000. Ore was rich in free gold.

Bibl.: Report XIII, p. 194.

Pickwick, a prospect, in Sec. 3, T. 27 S., R. 33 E., M. D. M., in the Pioneer district, about 35 miles north of Caliente, in the Sequoia Forest Reserve, consists of 80 acres, owned by John Ross of Bodfish. Small vein in granite, pay ore found in pockets. Slightly developed with a crosscut tunnel 180 feet long, which cuts the vein at a distance of 155 feet from the portal. Small producer. Worked by owner.

Pine Tree, also known as American, the only gold mine in the Tehachapi district, consists of 190 acres (170 patented and 20 held by location), in Secs. 3 and 4, T. 11 N., R. 15 W., S. B. M., about 6 miles south of Tehachapi, owned by Geo. Gordon. Elevation 5000 feet. Two parallel veins but only one, the Pine Tree, has been worked, 4 feet wide, strike northeast and southwest, dip 45° E., granite walls. Pay shoot 250 feet long and 4 feet wide, free milling. Workings consist of several tunnels on vein (longest 800 feet), and several thousand feet of drifts and stopes. Mine equipment consists of cars, shops and dwellings. Ore was reduced in a 4-foot Huntington mill, wood being used for fuel. Produced $250,000 from 1876 to 1907. Idle at present.

Bibl.: Report XIII, p. 194.

Piute Consolidated, a prospect, consists of 100 acres, in Valley View district, in Sec. 13, T. 28 S., R. 34 E., M. D. M., about 42 miles north of Caliente, in the Sequoia Forest Reserve, at an elevation of 7500 feet. Owner, R. L. Wilson, of Havilah. Vein is 2 feet wide, strike northeast and southwest, dip 45° S., granite footwall and quartz-porphyry hanging. Pay shoot 150 feet long, free milling. Workings consist of a crosscut tunnel 300 feet long, cutting the ore at a distance of 150 feet from the portal, short drifts and open cuts. Ore reduced in a 4-stamp mill on Clear Creek. Leased by Wilson. Owner in 1913 saved $2,500 on the plates from 80 tons of ore.

Phoenix Development Company, formerly known as Valverde, a prospect in Sec. 35, T. 29 S., R. 40 E., M. D. M., about ½ mile north of Johannesburg in Rand district, owned by Mrs. C. A. Burcham, of Randsburg. Elevation 3800 feet. Vein is large, but pay ore found in small lenses, schist formation. Equipment consists of 5-stamp mill and one stamp battery, operated by 15 h.p. gasoline engine, and a small friction hoist. Development work consists of shallow shafts and short drifts. Property produced $30,000. Idle.

Pinmore, prospect, formerly known as Crœsus, consists of 40 acres, in Sec. 26, T. 29 S., R. 40 E., M. D. M., in Rand district, about 1 mile north of Johannesburg. Owned by Los Angeles Company. Small veins in schist. Equipment consists of 15 h.p West Coast gas engine, skip and cars. The 10-stamp mill destroyed by fire. Company paid $5,000 in dividends in two years. Idle.

Placer Gold Company (placer), consists of 60 acres in Sec. 1, T. 30 S., R. 40 E., M. D. M., about ½ mile south of Johannesburg, in the Rand district, at an elevation of 3500 feet. Owners, Placer Gold Company, of Los Angeles; E. Dunham, president; H. R. Wynn, superintendent. Deposit consists of igneous materials from the surrounding hills. Worked by sluicing and concentrating on cocoa matting, then the coarse is crushed through a Bronze reduction mill and then over Cummings concentrating tables, the gold being extracted in amalgam barrel and the tungsten shipped to smelter. Water obtained from Randsburg Water Company and Santa Fe Railroad. Gasoline used for power, costing about 7¢ per cubic yard for gravel handled. Net profit per cubic yard $1.30. Plant handles 100 cubic yards daily. Six men employed. Ground worked from 1898 to 1913 by ''dry wash'' method.

Polar Bear, a prospect, consists of 80 acres, in Sec. 29, T. 27 S., R. 33 E., in the Pioneer mining district, about 34 miles north of Caliente, in the Sequoia Forest Reserve. Elevation 3200 feet. Small veins in granite. Worked for ''pockets'' by G. F. Haskins, the owner. One tunnel on vein 210 feet long. Produced $8,000 to date.

President, a prospect, consists of 20 acres in Sec. 4, T. 27 S., R. 32 E., M. D. M., in the Keyes district, about 5 miles south of

Isabella, in the Sequoia Forest Reserve, at an elevation of 3200 feet. Owner, U. T. Smith. Short pay shoot, granite footwall and granodiorite hanging. Tunnel on vein 465 feet long and 150 feet of drifts. Idle.

Pyramid, a prospect, in the Stringer mining district, about 5 miles northeast of Johannesburg, consists of 40 acres at an elevation of 4000 feet, owned by B. Ostick, of Randsburg. Small vein in schist. Workings consist of shaft 200 feet deep and 200 feet of drifts. Hoisting done with horse-whim. Property idle. Ostick also owns the Tip Top custom mill (5 stamps), near Atolia.

Queen Esther, one of the famous mines of the Mojave district, consists of 160 acres in Sec. 6, T. 10 N., R. 12 W., S. B. M., 4 miles south of Mojave, at an elevation of 3200 feet. Owners, Queen Esther Mining and Milling Company, Central Building, Los Angeles; S. W. Mudd, president; A. A. Burnard, manager; Gus Colberg, watchman. The vein has an average width of 8 feet, strike northwest and southeast, dip 40° E., granite-porphyry footwall and quartzite hanging. Pay shoot 500 feet long and 8 feet wide, free milling. Underground workings consist of several tunnels on the vein, drifts and stopes, making in all over 3500 feet of development. Equipment consists of cars, steam hoist, shops, office and dwellings. The reduction equipment consists of a 100-ton Cornish roll mill, and cyanide plant. Water obtained from Soledad pipe line. Property discovered in 1894 and worked until August, 1910, during which time several hundred thousand dollars in gold was extracted. Rich ore was shipped from the surface.

Rainbow, a prospect, 5 miles southwest of Johannesburg, in the Stringer district, consists of 30 acres, owned by B. Ostick, of Randsburg. Small vein in schist. Workings consist of a tunnel on vein 100 feet long and shallow shafts. A little ore shipped to his custom mill at Atolia. Owner doing assessment work.

Rand, a prospect in the Clear Creek mining district, consists of 20 acres in Sec. 3, T. 28 S., R. 32 E., M. D. M., about 25 miles north of Caliente, in the Sequoia Forest Reserve, at an elevation of 4500 feet. Owner, G. E. Bennett, of Caliente. The vein is 1 foot wide in granite, free milling. Workings consist of a tunnel on the vein 500 feet long and 400 feet of drifts. Two men driving a crosscut tunnel (contract work).

Rawhide, a prospect, consists of 40 acres in Sec. 28, T. 29 S., R. 34 E., M. D. M., in the Green Mountain district, about 23 miles northeast of Caliente, in Sequoia Forest Reserve, at an elevation of 7000 feet. Owner, A. R. Bulong, of Piute post office. Vein is 18 inches wide, strike north and south, dip 30° E., granite walls, free milling ore, high grade. Workings consist of a tunnel on the vein 380 feet long and 250 feet of drifts. Two men employed. Small producer.

Red Hill, owned by Orejana Mining Company, of Hayward, Cal.; C. S. Long, president and manager; consists of 24 acres (4 acres patented), in Sec. 21, T. 25 S., R. 33 E., M. D. M., in the Cove mining district, about ½ mile north of Kernville, in the Sequoia Forest Reserve, at an elevation of 3500 feet. Three parallel and three cross veins, slate footwall and granite hanging. Croppings on surface are 125 feet wide and carry some values in gold. A short tunnel and several open cuts constitute the development work. Adjoining mines: Zadel, Stirrup and Queirolo on west, Mystic on north, and northeast extension Sumner on south.

Red Hill Group, consists of 220 acres in Secs. 16 and 21, T. 25 S., R. 33 E., M. D. M., in the Cove district, about 1 mile north of Kernville, in the Sequoia Forest Reserve, at an elevation of 3600 feet. Owner, Orejana Mining Company, of Hayward; C. S. Long, president and manager. Three parallel veins having an average width of 10 feet. Lode outcrops for a distance of 8500 feet. Prospect.

Rose, a prospect, consists of 20 acres, patented, in Sec. 31, T. 26 S., R. 32 E., M. D. M., in the Greenhorn Mountain district, about 8 miles southeast of Isabella, in Sequoia Forest Reserve, at an elevation of 6000 feet. Owner, George King, of Isabella. Vein is 3 feet wide, strike northeast and southwest, dip 60° E., slate footwall and granite hanging. Workings consist of shaft 140 feet deep, 700 feet of drifts, and a crosscut tunnel 230 feet long. A little high-grade ore found. Idle.

Royal Bohn, a prospect in the Rand district, consists of 140 acres about 5 miles southwest of Randsburg, owned by A. M. Powell. Small vein in schist. Ore shipped to Red Dog custom mill. Small producer. Some tungsten mined. Three men employed.

Rustler and San Diego, a prospect adjoining the Yellow Astor mine on the west, consists of 40 acres in Sec. 2, T. 29 S., R. 40 E., M. D. M., about 1 mile west of Randsburg, in the Rand district. Owners, E. B. Maginnis and J. T. O'Leary, of Randsburg. Large body of low grade ore in schist and rhyolite, but only the high-grade streaks are worked. Three short tunnels and shallow shafts constitute the workings. Ore shipped to Red Dog custom mill. Two men employed. Small producer.

Santa Ana Gold Mines, formerly known as Napoleon Consolidated, a producer, consists of 40 acres in Sec. 11, T. 30 S., R. 40 E., M. D. M., about 2½ miles southwest of Randsburg, in the Stringer district, at an elevation of 4000 feet. Owner, Santa Ana Gold Mines Company, of

Los Angeles; F. Layton, president; J. Montgomery, secretary. Small vein in schist, high-grade ore, free milling. Workings consist of several shafts from 40 to 300 feet deep. Equipment consists of 15 h.p. Fairbanks-Morse gas engine, cars and shop. Distillate used as fuel, costing 20¢ per gallon. Ore is shipped to Red Dog custom mill. Property worked from 1896 to 1903 by the company, but since that time by lessees. A production record of $400,000 is claimed.

Shoestring, a prospect, consists of 20 acres in Sec. 12, T. 27 S., R. 32 E., M. D. M., in the Keyes district, about 4 miles south of Isabella, in the Sequoia Forest Reserve, at an elevation of 2800 feet. Owner, Geo. King, of Isabella. Small vein in granite, high-grade ore, free milling. Workings consist of a tunnel on vein 430 feet long and 600 feet of drifts. Idle.

Sidney Group, a small producer in the Rand mining district, consists of 260 acres in T. 30 S., R. 40 E., M. D. M., at an elevation of 4300 feet. Owner, A. C. White, of Randsburg. Several parallel veins in schist. Ore is free milling and runs from $10 to $200 per ton in gold. Shipped to Red Dog custom mill. Average profit per ton, $35. Workings consist of several shafts from 50 to 325 feet deep, 2000 feet of drifts and a number of stopes. Equipment consists of two gasoline hoists (18 h.p. and 50 h.p.), compressor plant, capacity three Ingersoll drills, shop and dwellings. Owner employs from three to ten men. Total production, $200,000.

Silver Boy, a prospect adjoining the Queen Esther mine on the east, consists of 80 acres in Sec. 6, T. 10 N., R. 12 W., S. B. M., in the Mojave district, about 3½ miles south of Mojave, at an elevation of 3000 feet. Owner, Gus. Colberg, of Mojave. Vein is 4 feet wide, quartzite footwall and granite-porphyry hanging. Slightly developed with shaft 100 feet deep and 200-foot drift. A shipment of 200 tons of ore to Selby smelter gave returns of $20 per ton in gold and $10 in silver.

Southern Cross Group, consists of 240 acres in Secs. 3 and 10, T. 28 S., R. 32 E., M. D. M., in the Clear Creek district, about 29 miles north of Caliente, in the Sequoia Forest Reserve, at an elevation of 4200 feet. Owner, A. Nielson, of Havilah post office. Vein is 20 feet wide, granite footwall and syenite hanging, strike northeast and southwest, dip 50° S. Ore free milling, low grade. Workings confined to the Mountain King claim and consist of a tunnel on the vein 360 feet long, 500 feet of drifts, and several open cuts. Two men employed.

Stanford, a prospect adjoining the Sunshine on the southwest, consists of 75 acres in Sec. 11, T. 30 S., R. 40 E., in Rand district, about 4 miles west of Johannesburg, at an elevation of 3800 feet. Owner, Sam Montgomery. Small vein in schist. Free milling ore, high grade. Workings consist of a shaft 425 feet deep and several thousand feet of drifts and stopes. Equipment consists of a 12 h.p. gasoline hoist, a horse-whim, cars, shop and dwellings. Worked to a limited extent by lessees. Small producer.

Summit Group, adjoining the Bright Star mine on the east, consists of 120 acres in Sec. 11, T. 28 S., R. 34 E., M. D. M., in the Green Mountain district, about 35 miles northeast of Caliente, in the Sequoia Forest Reserve. Owner, E. Roble, of Los Angeles. The vein is 2 feet wide, slate walls, and is an extension of the Bright Star lead. Workings consist of a shaft 100 feet deep and 1000 feet of drifts. Ore is free milling and runs $50 per ton. Two men employed. Prospect.

Sumner and North Extension, a famous producer in the pioneer mining days of Kern County, consists of 18 acres, patented in 1874, in Sec. 28, T. 25 S., R. 33 E., M. D. M., in the Cove district, about ½ mile north of Kernville, in the Sequoia Forest Reserve, at an elevation of 3000 feet. Owners, Kern Development Company of Portland, Maine, C. S. Long, president and manager; C. C. Hamilton, secretary. Local office, Kernville. Six veins; three parallel veins have an average width of 80 feet, slate footwall and granite hanging, strike N. 20° W., dip 70° W. (on Sumner claim). The three cross veins are smaller, having a width of 2 feet and are on the North Extension claim. The main workings are on the Sumner claim and consist of four shafts from 40 to 240 feet deep, three levels at 80′, 160′ and 240′; 2500 of drifts and two stopes, one 700 and the other 300 feet long. Ore is free milling. Equipment consists of a steam hoist, compressor plant, cars and shop. Ore reduced in 10-stamp mill on Kern River. Sumner claim has produced $600,000. Adjoining mines: Jeff Davis, Bull Run, Frank, and Orejana on the west, Big Blue on the south, North Extension Sumner on the north. Raymond in Seventh Annual Report of U. S. Commissioner of Mining Statistics, states: "That the Sumner produced, in 1874, 5000 tons of ore with an average yield per ton of $40, total bullion product $200,000, number of stamps 16, cost of mining per ton $2.50, cost of milling per ton $2, kind of power and amount, water, no limit."

Bibl.: Report VIII, p. 315. U. S. Commissioner of Mining Statistics, Seventh Report.

Sunset, a prospect, consists of 40 acres in Sec. 10, T. 27 S., R. 32 E., M. D. M., in the Pioneer district, about 33 miles north of Caliente in the Sequoia Forest Reserve. Owner, C. E. Pierrel, of Bodfish post office. Small vein of high grade ore in granite, free milling. Slightly developed with tunnel on vein 230 feet long. Worked by owner.

Sunshine, a prospect, consists of 18 acres, patented, in Sec. 11, T. 30 S., R. 40 E., M. D. M., in the Stringer district, about 2½ miles southwest of Johannesburg. Owner, T. W. Atkinson, of Randsburg. Small vein in schist. A shaft 500 feet deep and numerous drifts and stopes comprise the workings. Mine equipment consists of 25 h.p. gasoline hoist, air compressor, four machine drills and pumping plant to bring water from Johannesburg to the claim. Reduction equipment consists of a 3-stamp mill and cyanide plant, operated by gasoline. Idle.

Sunrise, a prospect, consists of 20 acres, in Sec. 10, T. 26 S., R. 29 E., M. D. M., in the Woody mining district, about 25 miles east of MacFarland. Owner, A. W. McRae, of Bakersfield. Vein is 2 feet wide, schist footwall and granite hanging. Ore is base, carrying gold and copper. Some rich ore found on the surface showing free gold. Slightly developed with a shallow shaft and a short tunnel on the vein. Idle.

Tip Top, a prospect, consists of 60 acres, in Sec. 14, T. 27 S., R. 33 E., M. D. M., in the Pioneer district, about 36 miles north of Caliente in the Sequoia Forest Reserve. Owner, C. E. Hayes, of Bakersfield. Small vein in granite. Workings consist of a tunnel on the vein 360 feet long and 200 feet of drifts. Idle.

Trestle, a prospect, owned by J. Trestle, and leased to the Practical Investment Company, of Los Angeles, W. R. Letton, president, is a small producer, in the Green Mountain district, in Sec. 18, T. 29 S., R. 34 E., M. D. M., about 26 miles northeast of Caliente, in the Sequoia Forest Reserve. Holdings consist of 60 acres, at an elevation of 7400 feet. Vein is small but high grade, granite walls. Ore is free milling. A tunnel on the vein 600 feet long and 200 feet of drifts comprise the workings. The ore is reduced in a 16-foot arrastra driven by steam power, wood being used for fuel. Four men employed.

Tropico, formerly known as Big Tree, is owned by the Tropico Mining and Milling Company, of Rosamond; V. V. Cochran, president; B. Gross, secretary. The holdings consist of 80 acres in Secs. 10, 11, 14 and 15, T. 9 N., R. 13 W., S. B. M., about 5 miles northwest of Rosamond, at an elevation of 2500 feet. The vein is 2 feet wide, strike northeast and southwest, dip 45° S., quartz-porphyry walls. Workings consist of a shaft 300 feet deep, 2000 feet of drifts and a stope 160 feet long. Mine equipment consists of a gasoline hoist, cars, shop, ore bins and dwellings. Reduction equipment consists of a 10-stamp mill, Blake crusher and cyanide plant. Gasoline used for power. Idle.

Urbana and Frank, consist of 24 acres, patented in 1882, in Sec. 28, T. 25 S., R. 33 E., M. D. M., in the Cove district, about ¾ of a mile north of Kernville in the Sequoia Forest Reserve. Owners, Kern Development Company, of Portland, Maine. C. S. Long, president and manager, Kernville. The vein has an average width of 18 inches, granite walls, strike S. 75° W., dip 70° N. Pay shoot is 700 feet long and 18 inches wide, free milling and high grade. Workings consist of five shafts from 50 to 180 feet deep, drifts and stopes. Ore milled in 10-stamp mill on Kern River. Production to date $200,000. Adjoining mines: Sumner on northeast, Bull Run on southwest, Lady Belle on south, and Beauregard on northwest. Rich ore extracted by lessees years ago.

White Star, a prospect, consists of 20 acres in Sec. 11, T. 27 S., R. 32 E., M. D. M., in the Pioneer district, about 32 miles north of Caliente, in the Sequoia Forest Reserve, at an elevation of 4300 feet. Owner, F. A. Braden, of Bodfish post office. Small vein, granite footwall and syenite hanging. Pay shoot is 40 feet long and 10 inches wide, free milling. Slightly developed with a tunnel on the vein 320 feet long, 400 feet of drifts and a stope 40 feet long. Reduction equipment consists of a 2-stamp mill (1000-pound stamps), steam driven, wood being used for fuel. Some rich ore mined. Property said to have produced $30,000. Idle.

Willow (placer), consists of 40 acres, in Sec. 22, T. 25 S., R. 33 E., M. D. M., in the Cove district, about $\frac{3}{4}$ of a mile north of Kernville, at an elevation of 2700 feet. Owners, Orejana Mining Company, of Hayward. C. S. Long, president and manager. River deposit, slate and granite bedrock, soft. Pay gravel is about 6 feet deep. Extent of deposit not determined. Ditch has a capacity of 300 inches, the water being diverted from the Kern River. Worked several years ago by ground sluicing. Idle.

Windy Gold Mining Company, controlled by John Singleton, of Randsburg, owns 90 acres in Sec. 34, T. 29 S., R. 40 E., M. D. M., in the Rand district, about $\frac{3}{4}$ of a mile west of Johannesburg, at an elevation of 3800 feet. Property leased to Fahey Bros. Small vein in schist, high grade ore, free milling. Workings consist of a shaft 200′ deep, drifts and stopes. Equipment consists of a horse-whim, cars, shop and dwelling. Ore is shipped to the Red Dog custom mill. Ore runs from $40 to $300 per ton. Two men employed.

Winnie, consists of 20 acres in Sec. 11, T. 30 S., R. 40 E., M. D. M., about 3 miles southwest of Johannesburg, in the Stringer district, at an elevation of 4000 feet. Owner, C. A. Koehn, of Randsburg. A number of small parallel veins in schist. Worked by means of shafts from 50 to 250 feet deep. Ore free milling, carrying a small percentage of tungsten. Horse-whim, shop and dwelling on the claim. Two men employed. Two lessees working a portion of the holdings. Ore shipped to Red Dog custom mill. Small producer.

Yellow Aster, the largest gold producer in southern California, and one of the noted mines of the State, is located in Sec. 2, T. 29 S., R. 40 E., M. D. M., in the Rand mining district, about 2 miles west of Johannesburg. The holdings, consisting of over 600 acres, are owned by the Yellow Aster Mining Company, of Los Angeles; John Singleton, president; Roselle Burcham, secretary. Elevation 5200 feet. The vein has an average width of 250 feet, schist hanging-wall, footwall not exposed as yet. The country rock consists of granite, porphyry and schist. The workings consist of a shaft 750 feet deep, 12 miles of tunnels, 15 miles of raises, winzes and stopes, and a number of open cuts Method of mining consists of open cut work, formerly by shaft and tunnels. Ore reserve about 5,000,000 tons of $3 rock. Mine equipment consists of three 7-ton Porter locomotives, 15 h.p. gas motor, machine drills, compressor plant, shops, 130 h.p. gasoline hoist and three air hoists. Reduction equipment consists of 130 stamps and cyanide plant (see photo No. 10). Steam power costs $12.50 per h.p. Electric power system being installed to connect with line of Sierra Power Company. Tailings stacked on the dump at present. About 500 tons of ore are crushed daily, free milling. Extraction about 98%. Yearly production $480,000. Production to date (1895–1914) over $8,000,000. Total mining and milling costs $1.55 per ton. Water is obtained by pumping from two springs, one at Goler, 7 miles northwest of the mine, and another 4 miles northeast; cost about 40 cents per 1000 gallons. About 20,000 b. m. feet of timber per month is required. Number of men employed 175. Monthly dividends at present $5,000. Adjoining mines: Consolidated on the east and Maginnes on the west.

Photo No. 10. New 100-stamp mill, Yellow Aster Mine.

Zenda, a producer, consists of 180 acres in Sec. 30, T. 30 S., R. 33 E., M. D. M., in the Amalie district, about 12 miles northeast of Caliente, in the Sequoia Forest Reserve, at an elevation of 3500 feet. Owner, Zenda Mining and Milling Company, of Los Angeles; Dr. C. W. Bryson, president; T. Martin, secretary. Leased to J. Faucet. Vein has an average width of 30 feet, granite footwall and quartz-porphyry hanging, strike northeast and southwest, dip 40° N. Pay shoot over 300 feet long and 30 feet wide, free milling. Workings consist of a tunnel on the vein 230 feet long and several hundred feet of drifts and stopes. Some ore extracted from open cuts. Several hundred thousand tons of ore in sight. An automatic tramway (48 buckets holding 200 pounds each), ¾ of a mile long, conveys the ore from the mine to the mill. Equipment consists of 120 h.p. Fairbanks-Morse gas engine, 20 h.p. pump, assay office, small electric plant, and dwellings. Reduction equipment consists of 10 stamps, tube mill (4¼′ x 18′), Dorr classifier and thickener, and five cyanide tanks (daily capacity 10 tons each). New equipment cost the lessee $40,000. The pebbles for the tube mill come from San Diego and cost $25 per ton. Gasoline used for power. Four men employed.

GYPSUM.

Gypsum deposits of varying quality occur for many miles along the lower foothills of the Sierra Nevada, reaching from Caliente on the south nearly to Porterville on the north.

In the valley of Cottonwood Creek, 5 miles north of Pampa Station, on the Southern Pacific Railroad, the beds are rather extensive, and a number of mines have been opened. The gypsum here occurs both as a crust on the surface and as interstratified beds. The latter vary in thickness from 20 inches to 5 feet, and lie upon a bed of marl. The material is sacked and hauled 8 miles to Wade Station, and is used for fertilizing purposes.

U. S. G. S. Bull. 223, p. 121.

W. A. Fauntleroy mined gypsum several years ago from his property in Secs. 21, 27, 28 and 29, T. 29 S., R. 30 E., M. D. M., on both sides of Cottonwood Creek.

Near McKittrick, in Sec. 21, T. 30 S., R. 22 E., a deposit of gypsum has been worked by the *California Gypsum and Mineral Company.* This deposit is 2 feet deep, and overlain by 6 inches of soil.

Abbott and Hickox own a deposit in Sec. 30, T. 30 S., R. 22 E., about 2½ miles southwest of McKittrick. Deposit that has been worked is about 500 feet long, 200 feet wide, and 12 inches thick. About 5000 tons have been shipped. The analysis of this gypsite gives an equivalent of 92.5% of gypsum (hydrous calcium sulphate).

There are several small areas in the vicinity of Sunset that carry thin deposits of gypsite. Large quantities are also reported in the southeastern part of Kern County.

Bibl.: Reports X, p. 223; XI, p. 233; XII, p. 324; U. S. G. S. Bull. 223, p. 121; Bull. 413, pp. 16–20.

IRON.

Deposits of iron ore occur at Woody, in Secs. 10 and 15, T. 26 S., R. 29 E., M. D. M.; at foot of Mount Breckenridge in Sec. 4, T. 29 S., and near San Emidio in Sec. 17, T. 9 N., R. 21 W., S. B. M. None of these deposits have been worked, and their commercial value is doubtful on account of the cost of transportation.

Iron Mountain, consists of 80 acres in Secs. 10 and 15, T. 26 S., R. 29 E., M. D. M., about 1½ miles south of Woody. Owned by J. Werringer of Woody. Deposit is 300 feet wide, consisting of magnetite, mica schist walls. A few open cuts constitute the development work. Some of the ore contains 70% iron.

Iron Mountain Nos. 1 and 2, consist of 40 acres at the foot of Mount Breckenridge, in Sec. 4, T. 29 S., R. 31 E., M. D. M., about 20 miles north of Caliente. Formerly owned by D. Lutz, of Bakersfield. Deposit consists of hematite from 10 to 300 feet wide, mica walls, strike northeast and southwest, dip 45° W. A few open cuts constitute the development work.

Two to One, located in Sec. 17, T. 19 N., R. 21 W., S. B. M., owned by C. R. Merriam, of Bakersfield. Consists of a massive deposit of hematite from 50 to 400 feet in width. Slightly developed by means of open cuts and short tunnels.

LIME AND LIMESTONE.

The lime industry is a large and important one at Tehachapi, on the Southern Pacific and Santa Fe railroads. The industry began several years ago by burning lime for local use, and then for shipment to other points, until now the Tehachapi lime is known all over southern California.

Limestone outcrops at many points in this area, also at Keene, and along Erskine Creek, some 30 miles north of Caliente (see photo No. 11.)

Jameson Lime Company owns an extensive deposit of limestone in the west half of Sec. 14, T. 32 S., R. 33 E., M. D. M., about 2 miles east of Tehachapi. These holdings, consisting of 320 acres, are controlled by J. W. Jameson, of Taft, and an excellent grade of lime is produced. The limestone is in part coarsely crystallized, and blue to white in color. The belt is at least 2500 feet wide and several hundred feet

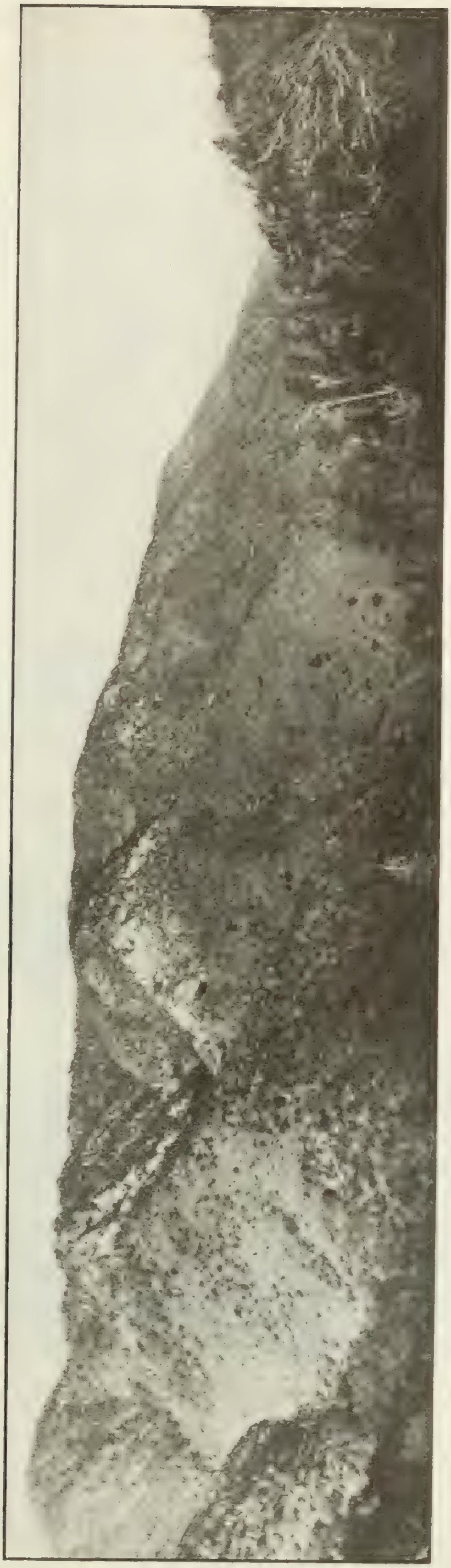

Photo No. 11. Limestone croppings along Erskine Creek.

thick, with practically no overburden. The deposit has been worked for twenty years. Limestone is burned in two modern kilns, having a daily capacity of 40 barrels each. Oil is used for fuel, costing 50¢ per barrel. Plant is operated about six months during the year, ten men being employed.

Bibl.: Bull. No. 38, p. 70. The Structural and Industrial Materials of California, issued by California State Mining Bureau.

Mountain Summit Lime Company, of Los Angeles, owns a large limestone quarry at Keene Station, 8 miles northwest of Tehachapi, and some years ago considerable lime was produced. Lime is similar to the Tehachapi product.

Summit Lime Company, formerly known as the Union Lime Company, owns 640 acres, patented in Sec. 35, T. 12 N., R. 15 W., S. B. M., about 3 miles south of Tehachapi. F. O. Wyman, president; W. O. North, secretary; C. W. Shoff, superintendent; Home office, 303 Heney Building, Los Angeles. Trade name, "Blue Summit Lime." The limestone occurs in heavy beds, with a strike of N. 75° W., and varies in color from white to light blue. It is all crystallized, in some places coarse grained, and elsewhere fine grained. The quarry is 300 feet long and 300 feet deep, the rock being conveyed to the kilns by an automatic tram. The company operates four kilns at the deposit, and four

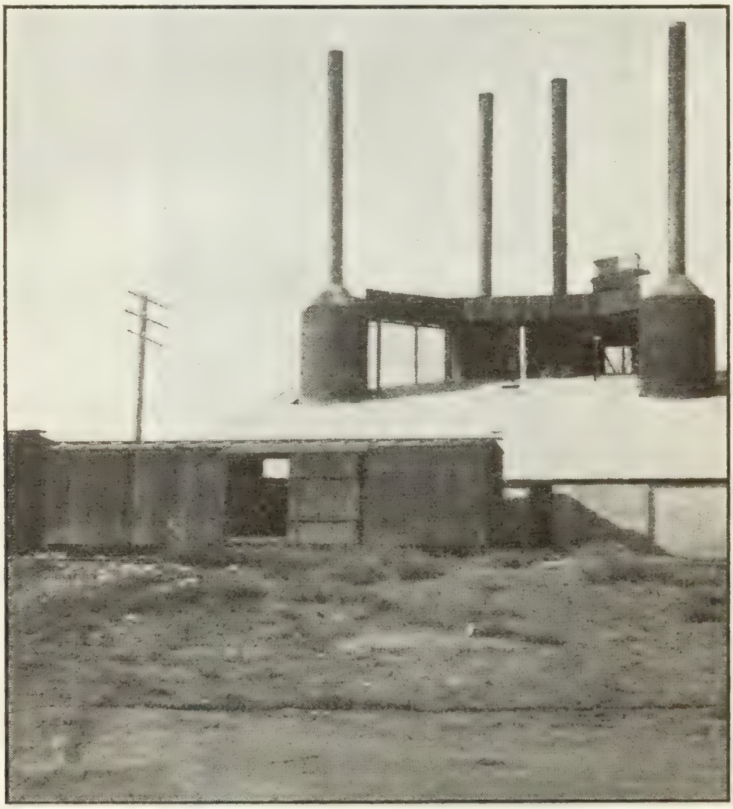

Photo No. 12. Summit Lime Company's Plant at Tehachapi.

near Tehachapi, in Sec. 21, T. 32 S., R. 33 E., M. D. M. (see photo No. 12). The limestone is hauled from the quarry to the Tehachapi plant, 3 miles, with eight-horse teams. Total capacity of the two plants is 560 barrels. Oil used for fuel. Output in 1912 was 120,000 barrels. Fifty men employed. Product sold in southern California and in Arizona.

Bibl.: Report XIII, p. 628; Bull. No. 38, p. 71.

MACADAM.

Kern County Rock Quarry, located in Sec. 21, T. 31 S., R. 32 E., M. D. M., at Keene Station, is owned by the county of Kern, and comprises an area of 100 acres, patented. The deposit is a rather coarse-grained, friable granite, which it is proposed to crush and use as macadam on the county roads. Such rock, however, is a poor road-making material. A large crushing plant, to be operated by electricity, is being installed. Twenty men employed.

MAGNESITE.

Bissell Deposit is unique in being the only occurrence of magnesite of evidently sedimentary origin that has been reported in the United States. These holdings, consisting of 40 acres, are located in Secs. 11 and 12, T. 10 N., R. 11 W., S. B. M., about ¾ of a mile north of Bissell Station, on the Atchison, Topeka and Santa Fe Railroad, 11 miles east of Mojave. Located in 1907 by B. M. Denison et al., of Tehachapi. The magnesite occurs in definitely bedded form, interstratified with clay and clay shales, the whole having a width of some 300 feet, and can be traced for a distance of 2500 feet. The workings consist of open cuts and shallow shafts from 10′ to 30′ deep.*

Section at prospect cut near Bissell Station shows:

	Feet	Inches
Magnesite		4
Clay, thin streak		
Magnesite		2
Clay, thin streak		
Magnesite		2
Clay (with thin streak of magnesite)		6
Magnesite		8
Clay, greenish	1	3
Magnesite		2
Clay, greenish	1	
Totals	4	3

(Bull. No. 540, p. 515, U. S. Geol. Surv.)

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*Shipments are being made (May, 1915) to the calcining plant of the Rex Plaster Co., at Los Angeles.

Analyses of samples of magnesite from Bissell.

	1	2	3	4
SiO_2	9.64	8.51	6.03	4.75
$Al_2O_3+Fe_2O_3$	2.46	2.94	1.40	.76
CaO	4.25	3.36	1.56	Trace
MgO	37.19	38.32	42.78	44.20
CO_2	40.70	40.12	45.78	47.32
Undetermined	5.76	6.75	2.45	2.97
Totals	100.00	100.00	100.00	100.00

Theoretically pure magnesite is composed of 47.6% of magnesia plus 52.4% of carbon dioxide.

Bibl.: Bull. No. 540, pp. 512–516, U. S. Geol. Surv.

MARBLE.

Marble occurs near Neenach, on the south slope of the Tehachapi range, in Brights Valley, in San Emigdio Canyon, and along Erskine Creek. The Neenach deposit is the only one that has been worked.

Antelope Valley Marble Quarry, owned by the Southern California Marble Company, is located in Sec. 2, T. 9 N., R. 17 W., S. B. M., near Neenach, on the south slope of the Tehachapi range. The deposit consists of a large body of fine-grained marble, consisting of a number of beds of various colors, dipping at an angle of 35° into the mountain. In the quarry is found white marble with reddish-brown and heavy blue veins. This marble has been used in the Stimson Block, Los Angeles, in the Spreckels bandstand, Golden Gate Park, Goldberg & Bowen's store, Sutter street, San Francisco. Quarry has been idle since 1904.

Bibl.: Report VI, part 1, p. 23; XIII, p. 629; Bull. No. 38, p. 100.

MINERAL SPRINGS.

Kern County has a number of mineral springs, especially along the Kern River. No water on the market.

Bibl.: Water Sup. Pap. No. 338, U. S. Geol. Surv.

Air Compressor Springs, also known as Hobo, owned by U. S. Government, consist of three springs on the Kern River in Sec. 15, T. 27 S., R. 32 E., M. D. M., about 3 miles west of Bodfish post office. Waters contain sulphuretted hydrogen; temperature 140° F.; said to be good for rheumatism. A number of people visit the springs during the summer months. No accommodations.

Delonagha Hot Springs, owned by H. H. Fish, of Bakersfield, consist of three springs in Sec. 26, T. 27 S., R. 31 E., M. D. M., about 34 miles north of Caliente, at an elevation of 2500 feet. Water contains iron, sodium and other salts; temperature 116° F.; said to be good for rheumatism. Accommodations for a small number of people.

Democrat Springs, owned by D. D. Hill, of Bakersfield, consist of five springs in Sec. 5, T. 28 S., R. 31 E., M. D. M., about 35 miles north of Bakersfield, at an elevation of 2250 feet. Auto stage conveys guests from Bakersfield to the springs. Water contains iron, sodium and other salts; temperature 115° F. Several buildings afford accommodations for a number of people.

Kernville Hot Springs, owned by A. Brown Company, of Kernville, consist of two springs in Sec. 34, T. 25 S., R. 33 E., M. D. M., on the Kern River, 2 miles northeast of Kernville, at an elevation of 2700 feet. Water contains iron and salts that are a curative for blood diseases; temperature 100° F. No accommodations.

Koehn Springs consist of five springs in Sec. 8, T. 30 S., R. 38 E., M. D. M., about 15 miles west of Randsburg. Water contains borax and other salts. Temperature 80° F.

Neill's Hot Springs, owned by J. Neill, of Isabella, consist of three springs in Sec. 31, T. 26 S., R. 33 E., M. D. M., about 3 miles north of Isabella, at an elevation of 2500 feet. Water contains iron, sodium chloride, and other salts; temperature 130° F.; good for blood diseases. Accommodations for a few guests.

Werringer Sulphur Springs, owned by J. Werringer, of Woody, consist of six springs in Sec. 3, T. 26 S., R. 29 E., M. D. M., about ½ mile south of Woody, at an elevation of 1600 feet. Water contains sulphur and some iron. Accommodations for several people.

Willow Springs, owned by E. M. Hamilton Estate, consist of twenty-three springs in Sec. 13, T. 9 N., R. 13 W., S. B. M., about 3 miles west of Rosamond, at an elevation of 2600 feet. Water contains sodium chloride, borates, and other salts. Well known summer resort. Accommodations for a number of guests.

NATURAL GAS.

The production of natural gas in 1913 amounted to 7,111,237 M cubic feet, valued at $568,899. (For details see Bulletin No. 69, issued by California State Mining Bureau.)

ORNAMENTAL STONES.

Sapphirine chalcedony is found at Kane Springs, in masses of a deep sky-blue color, with the grape-cluster surface characteristic of this material. Undeveloped; extent not determined.

This stone was highly valued in ancient times and was a favorite material for the carved Babylonian seals, 3000 to 4000 B. C. That used for this purpose came from Persia.

Bibl.: Bull. 37, p. 73.

Rose quartz and opal reported in Kern County, north of Kernville, by J. W. Stockton, of Wasco.

PETROLEUM.

Kern produces more petroleum than any other county in California, and over 58% of the total yield of the state.

Production in 1913 amounted to 58,698,432 barrels, valued at $27,038,474. (For details see Bulletin No. 69, issued by California State Mining Bureau.)

SANDSTONE.

A large quantity of sandstone is found a few miles south of Tehachapi, and in San Emigdio Canyon, the former deposit being worked several years ago by the Kern Development Syndicate.

Kern Development Syndicate Quarry, owned by the Kern Development Syndicate, of Los Angeles, consists of 140 acres in Sec. 14, T. 32 S., R. 34 E., M. D. M., 6 miles south of Tehachapi, and 3 miles from Erie Station, on the Southern Pacific and Santa Fe railroads. The sandstone is of many colors—green, blue, red, tan and drab. The formation lies at an angle of 10°, and varies in thickness from 3 to 30 feet. The supply seems to be unlimited. The stone used in the construction of the Pasadena library building, and the Date and Fish blocks of Los Angeles. Quarry idle.

Bibl.: Bull. 38, pp. 128 and 370.

SULPHUR.

In the Sunset oil district, on the western side of Kern County, there are deposits of sulphur which altogether cover an area of several acres. Open cuts from 10 to 15 feet deep show that these deposits are made up of both high and low grade sulphur ore, the larger part, however, consists of drift cemented with sulphur or decomposed rock or earth permeated with sulphur.

Bibl.: Bull. 3, p. 33; Bull. 38, p. 372; Reports XI, p. 233, and XII, p. 410.

TUNGSTEN.

Scheelite ($CaWO_4$), the principal tungsten mineral of the State, is found in the Amalie, Rand and Stringer districts, where it is usually gold bearing.

Bibl.: Bull. 67, p. 176.

Black Hawk Group (listed under Gold).

Gold Crown Consolidated (listed under Gold).

J. Hodgson, Care American Hotel, Howard St., San Francisco, has a deposit of tungsten ore, in the form of hübnerite. It is ½ mile from the Granite King Mine, 28 miles west of Randsburg.

Monarch Tungsten Gold Mining Company (listed under Gold).

Placer Gold Company (listed under Gold).

Royal Bohn (listed under Gold).

Santa Ana Gold Mines (listed under Gold).

Sunshine (listed under Gold).

Winnie (listed under Gold).

BIBLIOGRAPHY.

REFERENCES—State Mining Bureau Publications.

Report IV, pages 31, 159, 220, 224, 226, 227, 264, 293, 296, 374, 375, 379.
Report V, pages 67, 68, 71, 88, 89, 92, 93, 95, 106, 107, 113, 117, 118.
Report VI, Part I, pages 22, 23, 29, 36, 54–58, 93, 95–97, 105, 111–113, 117, 125, 136, 137; Part II, pages 63, 184.
Report VII, pages 66–70.
Report VIII, pages 24, 309–324.
Report IX, page 46.
Report X, pages 219–226.
Report XI, pages 233–239.
Report XII, pages 26, 28, 141–148, 324, 334, 353, 354, 410, 456–459.
Report XIII, pages 31, 35, 185, 199, 534, 535, 605–614, 628.
Bulletin No. 3, pages 21–53.
Bulletin No. 19, pages 106–131.
Bulletin No. 24, page 50.
Bulletin No. 32, pages 12, 13, 17, 19, 34, 35, 51–55, 195–197, 222, 224, 225.
Bulletin No. 37, pages 52, 101, 106.
Bulletin No. 38, pages 69–72, 100, 128, 167, 168, 212, 274, 275, 284, 355, 359, 361, 363, 365, 366, 367, 369, 370, 372, 374, 376, 378.
Bulletin No. 50, pages 293–297.
Bulletin No. 67, pages 10, 19, 20, 22, 25, 28, 29, 43, 46, 48, 52, 58, 59, 61, 66, 67, 69, 72–75, 77, 79, 84, 90, 93, 96, 108, 110, 135, 151, 156, 170, 172, 176, 177, 180, 185, 193, 196.
Bulletin No. 69, pp. 118, 195, 196, 205, 307, 501.

REFERENCES—U. S. Government Publications.

U. S. Pacific R. R. Report, Executive Document No. 78, Senate 33d Congress, Second session, published 1856, page 18; Vol. 5, page 15.
Geology of California, Vol. I, p. 217, published in 1865.
U. S. Geol. Survey, Mineral Resources of U. S., 1882, pages 438–439.
U. S. Geol. Survey, Mineral Resources of U. S., 1883–84, page 641.
U. S. Geol. Survey, Mineral Resources of U. S., 1885, page 387.
U. S. Geol. Survey, Mineral Resources of U. S., 1903, pages 173, 175, 176, 681, 682, 685–687.
U. S. Geol. Survey, Mineral Resources of U. S., 1904, pages 165, 166, 171–175, 718, 719, 723, 724.
U. S. Geol. Survey, Mineral Resources of U. S., 1905, pages 163–169, 171–173, 177.
U. S. Geol. Survey, Mineral Resources of U. S., 1906, pages 178–182, 184, 185, 189, 874, 875, 879.
U. S. Geol. Survey, Mineral Resources of U. S., 1907, Part I, pages 189–193, 198, 199, 209, 210. Part II, pages 409, 410.
U. S. Geol. Survey, Mineral Resources of U. S., 1908, Part I, pages 316, 318–320, 324–326, 335, 336. Part II, pages 335, 336.
U. S. Geol. Survey, Mineral Resources of U. S., 1909 Part I, pages 261, 263–265, 268, 269, 276, 277. Part II, pages 372–375.
U. S. Geol. Survey, Mineral Resources of U. S., 1910, Part I, pages 349, 350, 352, 354, 358–360, 367, 368. Part II, pages 413, 418–420.
U. S. Geol. Survey, Mineral Resources of U. S., 1911, Part I, pages 465, 466–470, 474–476, 485, 486. Part II, pages 427–429.
U. S. Geol. Survey, Mineral Resources of U. S., 1912, Part I, pages 262, 571, 572, 575–578, 581, 584–586, 591, 612–614. Part II, pages 450–452.
Bulletin No. 18, U. S. Geol. Surv. Irrigation near Bakersfield, Cal.
Bulletin No. 46, U. S. Geol. Surv. Kern River (Physiography).
Bulletin No. 46, U. S. Geol. Surv. Water Supply paper, physical characteristics of Kern River, Cal.
Bulletin No. 213, U. S. Geol. Surv. McKittrick.
Bulletin No. 223, U. S. Geol. Surv. Page 121.
Bulletin No. 406, U. S. Geol. Surv. McKittrick-Sunset.
Bulletin No. 413, U. S. Geol. Surv. Gypsum deposits of Cal., pages 16–20 (pages 23–47).
Bulletin No. 430, U. S. Geol. Surv. Gold mining in the Randsburg quadrangle.
Bulletin No. 471, U. S. Geol. Surv. San Joaquin Valley, south end.
Bulletin No. 540, U. S. Geol. Surv. Magnesite deposits in California, pp. 512–516.
Water Supply Paper No. 338, U. S. Geol. Survey.

KINGS COUNTY.

By WALTER W. BRADLEY. Field Assistant.

Field Work in September. 1914.

Kings County was created March 22, 1893, from a part of Tulare, and in 1909 extended by annexing a portion of Fresno County, so that at the present time its area is 1257 square miles. Its outline approximates a right triangle with the vertical side on the east, bounded by Tulare County, and the hypothenuse on the northwest, bounded by Fresno. Kern County forms the base at the south, while Monterey adjoins on the southwest, cutting off the point of the angle. The most notable single geographical feature of Kings County is Tulare Lake, which has varied in the past from a condition of complete dryness to a water area of over 400 square miles. Its present area is between 30 and 40 square miles. Its water is derived from the Kings River in high flood periods, and the reason for such wide variation in superficial area is that it lies in a shallow basin with very flat-sloping sides.

With the exception of the Kettleman and Kreyenhagen Hills and the edge of the Diablo Range at its southwest corner, Kings County is almost entirely a valley county. For this reason its mineral resources are not as prominent as its agricultural interests. The value of the total recorded mineral production of the county to the end of 1913, is $219,830. To this sum, the following have contributed in the order named: Brick, quicksilver, fuller's earth, natural gas, gypsum and mineral paint. Occurrences of chromite are known but they are as yet undeveloped.

The southwestern two thirds of the county is lacking in transportation facilities, while the northeastern part has both the transcontinental line of the Santa Fe and two branch lines of the Southern Pacific Railroad.

The Associated Oil, Standard Oil and Independent Producers' Transportation companies have oil pipe lines passing through the county, but no oil has as yet been produced here in commercial quantities. The San Joaquin Light and Power Company supplies portions of the county with electricity.

KINGS COUNTY—Table of Mineral Production.

Year	Brick		Gypsum		Natural gas		Quicksilver		Miscellaneous and unapportioned	
	Thousands	Value	Tons	Value	Thousand cubic feet	Value	Flasks	Value	Kind	Value
1894										
1895										
1896										
1897										
1898	1,250	$8,450								
1899	1,650	11,550								
1900	750	5,000							Unapportioned, 1900–1909	$10,500
1901	1,000	5,000								
1902	3,500	19,000								
1903	3,400	24,200								
1904	3,100	23,300					*250	$9,000		
1905	3,400	24,000								
1906	2,800	20,000							100 tons Fuller's earth	1,000
1907	1,000	8,000							50 tons Fuller's earth	1,000
1908	3,000	24,000	100	$400					100 tons Fuller's earth	2,000
1909	1,000	8,500	100	300	360	$360			20 tons mineral paint	100
1910	400	3,200	100	490	1,200	600	100	4,525	100 tons Fuller's earth 10 tons mineral paint	1,000 270
1911			20	100		800				
1912			50	200		1,650			20 tons mineral paint	60
1913			100	300	1,916	575			Other minerals	400
Totals	26,250	$184,200	470	$1,790		$3,985	350	$13,525	Miscellaneous	$16,330

*Flasks of 75 pounds.

Totals.

Brick	$184,200
Gypsum	1,790
Natural Gas	3,985
Quicksilver	13,525
Miscellaneous and Unapportioned	16,330
Total to end of 1913	$219,830

BRICK.

Clinker Brick Company, J. H. Burnett, Hanford, owner. This plant has been idle since 1911, and is now partly dismantled. It is at Clinker siding on the Santa Fe, 1½ miles south of Hanford. A stiff mud and wire-cutting brick machine and three field kilns were used. Power was furnished by an oil burning steam plant. All bricks for local operations are at present shipped in from points outside of the county.

Trewhitt Brickyard, Hanford, abandoned.

Bibl.: Bull. No. 38, p. 243.

CHROMITE.

Chromite float has been found in the serpentine area at the southwest corner of Kings County, near Parkfield, Monterey County, but the deposits are as yet undeveloped.

FULLER'S EARTH.

C. E. Boyd of Hanford reports a small production of both fuller's earth and gypsum from a group of claims in Sec. 13, T. 24 S., R. 17 E., in the edge of the Kreyenhagen Hills northwest of Dudley. Two men were at work a part of the year.

Tulare Lake View Group. Louis and Oscar Couch, R. E. Stevens et al., of Hanford, have located this group of five claims in Secs. 26, 35 and 36, T. 21 S., R. 17 E., in the Kettleman Hills, near the Fresno County line, southeast of Coalinga, for ''gypsum, fuller's earth and phosphates.'' Only assessment work has been done so far.

GYPSUM.

C. E. Boyd of Hanford reports a small tonnage of gypsum produced in 1913, as well as fuller's earth, from his claims in Sec. 13, T. 24 S., R 17 E., northwest of Dudley. (See also under Fuller's Earth.)

Tulare Lake View Group (see under fuller's earth).

MINERAL PAINT.

C. E. Boyd of Hanford reports having produced a small tonnage of mineral paint in connection with fuller's earth and gypsum from claims near Dudley, in the southwestern corner of the county.

NATURAL GAS.

Natural gas is obtained from a number of artesian wells around the eastern side of Tulare Lake, in T. 21 and 22 S., R. 22 E., south of Corcoran and west of Angiola; also in T. 20 S., R. 20 E., near Stratton (Stratford post office), on the north side of the lake. The gas is found at varying depths down to between 1000 and 1100 feet. Some of the wells yield sulphur water. The gas is utilized locally, on several of the ranches where found, for lighting and heating, and also for operating gas engines. Among those having gas wells may be mentioned the following:

Boot Bros. (see E. Workman).

L. Charles of Hanford, in Sec. 13, T. 22 S., R. 22 E., west of Angiola.

R. D. Hunter, near Corcoran, has two 2-inch bored wells, 300 to 500 feet deep, both flowing.

A. H. Johnson, in Sec. 26, T. 21 S., R. 22 E., 2 miles south of Corcoran.

O. P. Quimby, in Sec. 24, T. 22 S., R. 22 E., west of Angiola.

W. N. Stratton of Stratford, on his ranch near that place.

L. D. Tennant, P. O. box 86, Corcoran, in Sec. 14, T. 22 S., R. 22 E., west of Angiola.

Esau Workman (formerly Boot Bros.), in Sec. 25, T. 22 S., R. 22 E., west of Angiola.

Bibl.: R. XIII, p. 567; Bull. 3, pp. 20, 68; Bull. 19, p. 183.

PETROLEUM.

There are a couple of strips of possible oil-producing territory in the Kettleman and Kreyenhagen Hills, running through Kings County, between the Coalinga district of Fresno County on the northwest and the Lost Hills district of Kern County to the southeast. A number of companies are drilling in this section, but no production of oil in commercial quantities has as yet resulted. For a detailed description of the geology and possibilities of this district, see Bulletin No. 69 of the State Mining Bureau, "Petroleum Industry of California."

QUICKSILVER.

The quicksilver district of Kings County is at its extreme western end in the corner formed between Fresno and Monterey counties. It is on the eastern edge of Table Mountain which extends northwesterly through that part of Monterey and forms a portion of the boundary with Kings. Table Mountain is principally of serpentine. Parkfield, Monterey County, is the nearest town.

Dawson Pit. H. Dawson, Lemoore, owner. This is a quicksilver prospect on patented land in the NW. ¼, Sec. 28, T. 23 S., R. 16 E., near the Kings Company. Only a small amount of development work has been done.

Bibl.: Bull. No. 27, p. 122.

Fair View Group. G. H. French and J. A. Greenlaw, Parkfield, owners. In the SW. $\frac{1}{4}$, Sec. 28, T. 23 S., R. 16 E. Assessments only.

Bibl.: Bull. No. 27, p. 122.

Francis Claims (see Kings Quicksilver Mining Company).

Kings Quicksilver Mining Company, Ltd. Wm. Gray, president; W. P. Darsh, secretary; office, 520 King street, London, Ontario, Canada. A. A. Lewis, superintendent at the mine. This property includes the Segregation and Summit claims owned by C. F. Francis, under bond, besides a number of claims located by members of the company on adjoining ground. The group is principally in Sec. 20, T. 23 S., R. 16 E., 14 miles by road east of Parkfield and 40 miles north of east from San Miguel on the Coast Division of the Southern Pacific Railroad. Elevation 3100 feet (bar.) at the lower tunnel. The country rocks are serpentine, shale and metamorphic sandstone. The ore values occur in a crushed zone, in part as stockworks, carrying cinnabar and native mercury with some calcite. In the upper level this zone shows about 35 feet wide, with strike southeast and dip 45° to 50° SW., and when visited had been drifted on for 70 feet. The upper adit was in 700 feet (part crosscut and part drift), with two raises to the surface and one winze of 85 feet to the lower adit. The latter has 850 feet of work and reaches a depth of 200 feet below the outcrop. Five men were at work. Hand drills and augers are used.

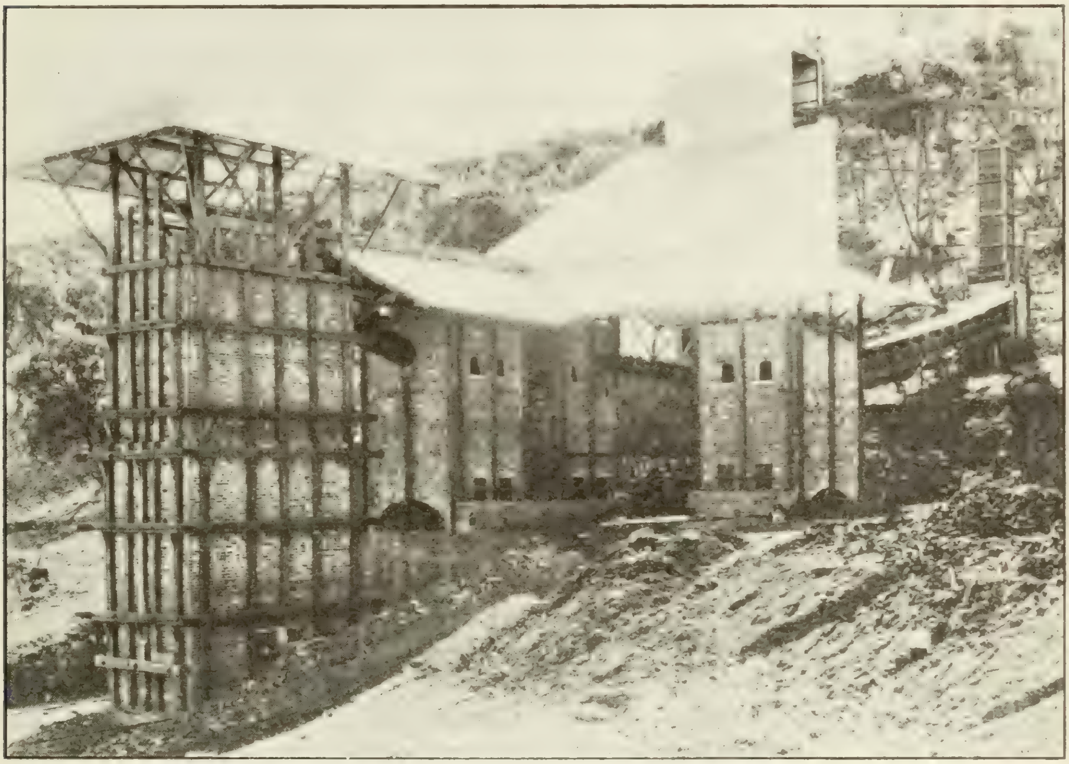


Photo No. 116. Ten-ton Scott fine-ore furnace and condensers, Kings Quicksilver Mining Company, Ltd., Kings County, California.

The mine was originally worked about 1902, and again in 1905 and 1910, during which operations it is credited with a total output valued at over $13,000. The reduction equipment consisted of a series of pipe retorts. The present company has this year completed a 10-ton Scott fine-ore furnace (see photo No. 116), with brick condensers. The bricks were burned in a field kiln at the mine. It is intended to install concentrators. These and the rock breaker will be driven by a 25 h.p. crude oil engine; and the furnace blower by a 4 h.p. distillate engine.

Bibl.: Bull. No. 27, p. 122; *U. S. G. S.*, Min. Res. 1902, p. 253; 1912, Pt. I, p. 939; 1913, Pt. I, p. 204.

Segregation and Summit (see Kings Quicksilver Mining Company).

MADERA COUNTY.

By R. P. McLAUGHLIN and WALTER W. BRADLEY, Field Assistants.

Field Work in July, 1913, and July, 1914.

Madera County, which was created March 11, 1893, has an area of 2112 square miles. It was formed from Fresno County which adjoins it on the south and west, the San Joaquin River being the boundary line between the two. On the north are Merced and Mariposa counties, with Mono on the east.

Madera County is longest—approximately 100 miles—in a northeast-southwesterly direction. The western half is in the San Joaquin Valley proper, while the eastern boundary line runs along the summit of the divide of the Sierra Nevada Mountains and possesses a number of peaks exceeding 12,000 feet in altitude. Among these may be mentioned: Mt. Lyell, 13,090 feet; Rodgers Peak, 13,056 feet; Ritter Mountain, 13,156 feet; McClure Mountain, 12,500 feet; Banner Peak, 12,957 feet; and the Minarets, 12,000 to 12,278 feet. The high Sierran section abounds in glacial lakes and meadows. The Devil's Post Pile, a knob of hexagonal, basaltic columns, which has been designated as a ''National Monument'' is in this part of Madera County near Mammoth Pass and the head of the Middle Fork of the San Joaquin River.

Geology.

A detailed geological survey was not made, but a general description can be given, as the relations of the formations are comparatively simple. There are several parallel belts running northwesterly across the county.

The western part of the county (the San Joaquin Valley) is nearly level and consists of sedimentary and alluvial beds lying nearly horizontal. These horizontal beds rest on steeply dipping schist which is exposed in the westerly foothills forming the eastern margin of the San Joaquin Valley.

The schist belt is 4 or 5 miles wide, its western boundary being the eastern edge of the flat floor of the San Joaquin Valley. The eastern boundary of the schist is a contact with granite or granodiorite which line runs as follows: From the western base of Green Mountain crossing the Southern Pacific Railroad about 1 mile east of Jesbel to a point near Sesame. This zone of schist contains the copper deposits of the county. It has been looked upon favorably by some people desirous of prospecting for oil, but of course no such occurrence is probable or even possible.

The granite occupies a zone from 5 to 10 miles wide, its eastern boundary being schist or slate. This line of contact runs southwest from Grub Gulch to Coarse Gold and the vicinity of Hildreth. The granite or granodiorite is usually coarse-grained and decomposed for a depth of about 20 or 30 feet. Exceptional spots exist where the rock is fine-grained and not decomposed to great depth. It is these exceptional spots which furnish the valuable deposits of building stone. Dikes are in evidence in various parts of the area standing up as ridges 40 to 50 feet wide. The dikes observed were of finer texture than the surrounding rock and possibly composed of different minerals, as muscovite was noted in some of them.

Schist and slate exist as a belt from 3 to 5 miles wide along Potter Ridge. Its eastern boundary is a contact with a large body of granite. The contact runs immediately west of Wassamma ("Poison Switch") and near Lone Cedar Ranch. Granite dikes, from a few feet to ¼ mile wide, cut the slate and schist in many places. This is more fully illustrated with a drawing by W. H. Storms, Report of State Mineralogist, XII, 1894, p. 166. This belt of schist and slate carries most of the gold bearing veins of the county. Toward the east, into the high Sierras, most of the rock is granite, with some metamorphic areas near Mt. Raymond and around The Minarets. Within the larger granite area, occupying the eastern portion of the county, are found smaller areas of metamorphic rock, largely quartzite.

Mt. Raymond, White Chief Mountain and Iron Mountain, T. 5 S., R. 22 and 23 E., immediately east of the Mariposa Big Tree grove, are composed largely of metamorphic rocks. The most of it is quartzite which in some places shows the original bedding very much contorted. In most places, however, the rock is massive and cut by numerous fractures or cleavage planes. Granite and possibly other igneous rocks are observed occasionally as though intruded in large masses. South of the Big Trees, along the road from Summerdale ("Fish Camp") to Mt. Raymond, basic igneous rock occurs, probably as surface flows similar to those observed farther east.

Considerable prospecting was done in the region some twenty or thirty years ago, apparently without favorable results. Recently considerable work has been done in prospecting for iron and copper. Specimens of the following minerals were collected in the district: sphalerite, pyrrhotite, magnetite, chalcopyrite, pyrite, bornite and siderite.

Geologic notes—Sierra Nevada Mountains, southwest of Mono Lake.

The following geologic observations were made during a hasty trip and are presented as of possible value to future work in the neighborhood:

At the head of Bloody Canyon midway between Sardine Lake and Walker Lake is a contact of granodiorite and metamorphic rock, the latter lying to the west. The red color of the canyon sides seems due to iron oxide from the weathered metamorphic rocks. Dikes of considerable size cut the granodiorite.

The metamorphic rock from Mono Pass to Parker Peak are mostly of a slaty nature, almost black. They dip steeply and are probably a portion of a fold formed at the time of the granite intrusion. All of the dips observed by the writer were to the west, but, according to the old State Geological Survey, farther north and west the series dips toward the east, indicating a synclinal fold. Bedding is distinct and singularly regular in strike, especially near Parker Peak, where it is N. 25° W. About ½ mile east of Mono Pass schist and conglomerate accompany the slate. Very little quartz float is observed in the débris but at Mono Pass there are several old prospect holes all apparently idle for many years. Running N. 25° W. for about 2 miles from the summit of Parker Peak is a particularly noticeable light colored bed or dike following the bedding. About 1 mile west of Parker Lake, on the north side of the canyon, is a very prominent outcrop exposed for several thousand feet and suggesting by its appearance a quartz ledge. The western edge of this metamorphic mass is clearly exposed in contact with granitic rocks and runs along the following southerly line from a point ½ mile west of Tioga Pass to a point ¼ mile east of Mammoth Peak, thence along the eastern base of Kuna Crest near the west shore of Helen Lake and about ¼ mile west of Kuna Peak. The entire region is smoothed off by glaciation. Some prospecting work was done in past years at the foot of the permanent snow bank of the slope of Kiop and Parker peaks, evidently without success.

South of Parker Peak the metamorphic series continues its western margin, being near Kiop Crest and extending to the west shore of Gem Lake and its eastern margin being somewhere to the east of the ridge from Mt. Wood to Agnew Lake. At the south shore of Alger Lake the dip is about 45° to the southwest and about 80° to the southwest near Gem Lake. One fourth mile north of Alger Lake is an exposure of quartz, about 10 feet wide and 300 feet long, upon which some prospecting has been done, otherwise but little quartz was seen.

From Gem Lake to Agnew Meadows the metamorphic series continues clearly exposed with steep western dip and uniform northwestern strike. In this region there are numerous quartz veins conforming to the bedding. The North Fork Mining District was formed here in 1878, and some prospecting work was continued until 1892 when E. B. Preston described the district (Report State Mineralogist 1892, p. 218) as showing some ten veins on the east side of the Middle Fork of San Joaquin River, within a distance of about 3000 feet across the formation, having an average width of 45 feet each, the largest being 75 feet wide and the smallest 15 feet wide. "An average assay made in the State Mining Bureau from a sample of mixed ores from the different veins gave a higher result (than $30) in—silver and (over 17 per cent) lead. Some samples from the west side veins showed a yield of 30 per cent copper and 27 ounces silver.'' The report also states that there are some nine veins on the west side of the river averaging 30 to 40 feet in width, carrying a large percentage of copper. The average sample above mentioned was not, it is learned, taken across the entire vein widths but only in its mineralized streaks. The district is now entirely idle.

The most easterly exposure of the metamorphic series in this neighborhood is at the edge of a more recent flow of basic lava which apparently forms the summit of the ridge bounding Mono and Madera counties. This line of contact runs from the south end of Gem Lake near the trail for a distance of about 3 miles; thence gradually toward the east and over the summit about 2 miles south of Deadman Pass. The western or metamorphic side of the valley is of the usual smooth glacial shape while the eastern or lava side is terraced, which brings up the question as to age of the lava as compared with the glacier.

The western margin of the metamorphic series crosses the river about ½ mile north of Soda Spring and courses about S. 25° E., thence the prevailing country rock in a southwesterly direction is granitic. Occasional patches of basaltic lava lying on the granite, are encountered on the trail to Little Jackass Meadow, as follows: One mile south of Soda Spring, at the Devil's Post Pile; on the summit between Snow Canyon and Stairway Creek; and an outcrop extends for several miles along the eastern bank of the North Fork of San Joaquin River near Sheep Crossing.

Between Devil's Post Pile and Stairway Creek there is a thin mantle (possibly 2 feet) of pumice on the granite. Fragments larger than ½ inch are seldom seen. East and south of Devil's Post Pile for a considerable distance granite appears to be the prevailing rock although Mammoth Mountain is probably metamorphic. About 2 miles southwest from Mammoth Pass are two small craters, readily distinguished in the distance by their shape and color.

The lava at Devil's Post Pile is described by Preston as being glaciated, but also showing pumice cones of very recent date. The lava near Sheep Crossing has some glacial drift resting upon it. It lies in almost horizontal terraces and the topography several miles southwest suggests an extensive flow since cut by canyons.

In the vicinity of Little Jackass Meadow there is an extensive covering of glacial drift containing mostly granitic, some metamorphic and very rarely basaltic boulders.

One mile west of Little Jackass Meadows is an exposure of metamorphic rock (fine quartzite with a little mica) striking N. 15° W. Surrounding granite is glaciated.

From Little Jackass Meadows to Yosemite Valley, by way of Fernandez and Merced passes, only granite is seen.

Resources.

As will be noted from the Table of Mineral Production (p. 111) the following have yielded commercial quantities to the end of 1913 in the order named: gold, granite, copper, silver, brick, stone industry (outside of granite for building stone) and lead. In addition to these, occurrences are known of asbestos, iron, mineral water, turquoise and zinc, though as yet no commercial production of them has been made. The iron deposits, which are among the most important in the State, will be described later.

As has already been mentioned, previous to 1893, Madera County was a part of Fresno. Of the $1,555,888 gold and the $25,657 silver credited to Fresno County in the United States Mint Reports for the years 1880 to 1892 inclusive, between 80 and 90 per cent came from that portion of its territory in the schist belt between Grub Gulch and Hildreth, for which reason, $1,350,000 and $25,000, respectively, have been added to the outputs of those two metals, bringing the total value of mineral production for Madera County properties to $5,500,677 to the end of 1913. At the present time, granite is the most important mineral product of the county in point of value, followed by copper and gold in second and third places, respectively.

A recent development, which will prove of importance to the mineral industry in the future in this section of the State, is the advent of hydroelectric power. The San Joaquin Light and Power Corporation of Fresno has a reservoir and a 25,000 horsepower plant at Crane Valley on the North Fork of the San Joaquin River. Its power lines are now serving not only a large part of Madera County, but also a considerable area in Fresno, Tulare and Kern counties to the south, and Merced, Mariposa, and Stanislaus to the north.

The canal systems of Madera County, while they serve mainly for irrigation purposes, are yet worthy of mention here. The Madera Canal and Irrigation Company has more than 100 miles of ditches, distributing water principally from the Fresno River, and also from the San Joaquin River. In addition to the canals, water for irrigation is also obtained from artesian wells and by pumping. The Madera Sugar Pine Company has a 65-mile "V" flume (see photos No. 24 and No. 22), by which the sawed lumber is transported from its mill at Sugar Pine to the finishing mill and storage yards at Madera. In a busy season 350,000 feet b. m. are thus brought down per day, from eleven to twelve hours being required for the lumber to travel the 65 miles. The cost is but a fraction of what it would be by teams, as there is no railroad into that section.

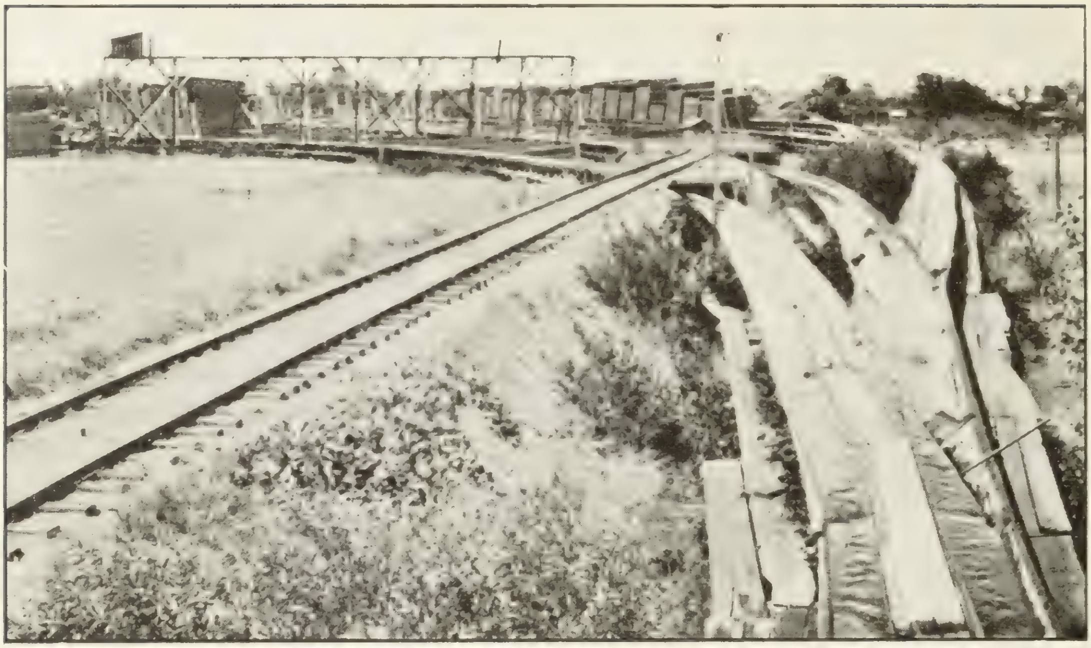


Photo No. 24. "V" Flume for transporting lumber, Madera Sugar Pine Company, Madera County, California.

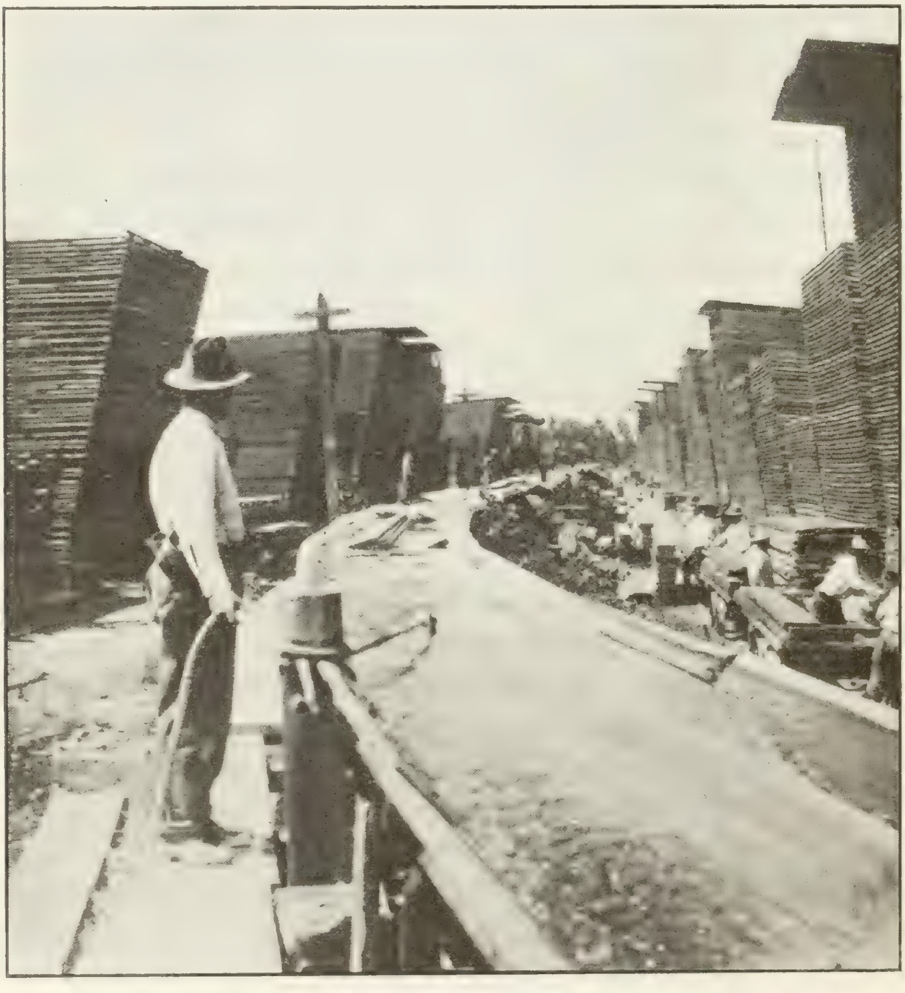


Photo No. 22. Discharging lumber from "V" flume, Madera Sugar Pine Company, Madera County, California.

Table of Mineral Production.

Year	Gold	Silver	Copper		Brick		Stone industry				Miscellaneous and unapportioned	
							Granite		Rubble and crushed rock			
	Value	Value	Pounds	Value	M.	Value	Cubic feet	Value	Tons	Value	Kind	Value
1893	$150,696	$314										
1894	107,791	180					48,858	$31,494				
1895	162,323						39,590	49,662				
1896	104,339	1,240					48,628	73,525	15,600	$7,800		
1897	85,963						39,030	37,215	3,996	1,249		
1898	94,884	50			400	$2,800	23,103	49,673	2,940	500		
1899	73,758	292			439	3,070	47,433	36,000	5,000	2,500		
1900	104,134	3,833	500,000	$77,500	500	3,000	124,015	80,000			1900-1909, unapportioned	$65,000
1901	82,749	2,600	108,430	17,077	500	3,000	96,716	294,799	2,400	600		
1902	35,128	3	18,600	2,139	230	1,840	105,845	78,041	10,000	4,000		
1903	93,070	3	36,000	4,680	216	972	128,581	389,800	4,000	1,000		
1904	75,303	25	10,300	1,313	750	3,750	113,627	98,083	1,000	500		
1905	50,867	10,014					42,316	123,106				
1906	22,390	508					65,472	176,416				
1907	13,303	506	1,895	379	1,250	12,500	99,278	93,372				
1908	45,107	1,264	113,293	15,454	250	2,250	140,086	123,668	8,560	2,140	2,279 lbs. lead	84
1909	14,716	403	5,000	635			142,622	111,380	182,177	5,836		
1910	10,076	1,850	336,667	42,876	740	3,700	99,192	74,152	2,550	1,112		
1911	1,958	77	14,608	1,826	270	1,350	99,900	74,190	1,300	800		
1912	9,162	1,162	248,129	40,941	300	1,500	82,135	56,058	12,851	3,213	5,533 lbs. lead	249
1913	14,489	1,617	532,403	82,522	315	1,650	150,994	270,123	7,380	1,466		
	$1,352,206	$25,941	1,925,325	$287,342	6,160	$41,382	1,737,421	$2,320,757	259,754	$32,716		$65,333
	*1,350,000	*25,000										
	$2,702,206	$50,941										

*80 to 90 per cent of amounts credited to Fresno County, 1880 to 1892, inclusive.

Totals.

Gold	$2,702,206
Silver	50,941
Copper	287,341
Brick	41,382
Granite	2,320,757
Rubble and crushed rock	32,716
Miscellaneous	65,333
Total	$5,500,677

ASBESTOS.

Amphibole asbestos occurs at the Savannah mine, near Grub Gulch, stated to be 4 feet wide and traceable over a distance of about 3 miles in length. It is undeveloped. The amphibole variety is also found at the Baker mine near Coarse Gold.

BRICK.

Sunset Brick Company (also known as the Dyer Brickyard). J. A. Dyer, Madera, owner; bonded to W. J. Keys. This plant at the south edge of town (Madera) is operated only intermittently according to demands of the local market. The clay is hauled in dump carts to the grinders, and a soft mud brick machine is used. The bricks are dried in the sun and burned in field kilns, using oil for fuel. Electric power is used, and when operating, from eleven to fifteen men are employed.

Bibl.: Bull. 38, p. 249.

COBALT (see under Nickel).

COPPER.

The foothill copper belt of the eastern side of the San Joaquin Valley extends in a southeasterly direction through Madera County and on into Fresno. It passes to the west of Raymond a few miles, and maintains the same characteristics which it shows farther north in Mariposa County. During the copper excitement of the early sixties the Buchanan mine near the Mariposa line in Sec. 33, T. 8 S., R. 18 E., was operated with a small furnace and is credited with having shipped 150 tons of copper bars up to 1866. At various times since, work has been done on that and a number of other properties in this section, but at present only one is yielding any copper—the Daulton.

Copper ores are also found in the Minarets section of Madera County in the high Sierras, but on account of its inaccessibility from transportation lines no production has as yet been made.

Bibl.: R. XI, pp. 218–223, XIII, p. 59, Bull. 50, pp. 269–276; Mineral Resources West of Rocky Mountains, 1868, pp. 174–213; 1872, p. 47.

Daulton Mine (formerly the California Copper Company, also Ne Plus Ultra). Walter Smith and L. M. Bradford, Madera, owners. This property is in Secs. 25 and 35, T. 9 S., R. 18 E., about 1 mile from Daulton Station on the Raymond branch of the Southern Pacific Railroad. It was first worked in the sixties and the ore shipped to Swansea, Wales. There have been no changes in the equipment since that described in Bulletin 50. There are three shafts, equipped with steam hoists. The present owners are working in a limited way, with four men, and shipping an occasional carload of ore to one or the other of the large smelters of the State.

Bibl.: Bull. 38, pp. 272-275.

Yosemite Copper Company (see under Iron).

GEMS.

Specimens of *turquoise* have been found at the Taylor ranch on the Chowchilla River, north of Madera; *garnets* at Grub Gulch and Fresno Flats; and *andalusite* on the Chowchilla River, north of Madera; but no commercial production has ever resulted.

Bibl.: Bull. 37, pp. 52, 107; Bull. 67, pp. 121, 128, 163; GEOLOGICAL RECONNAISSANCE IN CALIFORNIA, W. P. Blake, 1858, pp. 304–306.

GOLD.

Gold mining is at present not active in Madera County, although a great many prospects have been opened during the past thirty years. Only three mines (Enterprise, Gambetta, and Texas Flat) have been operated extensively of recent years, and are here described. Many mines or prospects mentioned in previous reports have lost their identity either by abandonment or consolidation. An effort has been made to here record all those which have received any appreciable attention or development.

Abby. Idle for many years; Sec. 30, T. 9 S., R. 22 E., patented; owner, James Ryan. It is reported to have produced considerable gold (see Bibliography). Vein strikes N. 10° E., dips 26° NW. Incline shaft 725 feet deep. Six levels ran north from 600 to 900 feet from the shaft and a short distance south. Stoping was carried on from all the levels, the vein being from 18 inches to 2 feet wide. Ten stamps and four Frue vanners constituted the milling equipment with a capacity of 42 to 48 tons per twenty-four hours. Reported value of ore is $20, with 2 per cent sulphurets, valued at $200 per ton. About 30,000 gallons of water were pumped in twenty-four hours.

Bibl.: R. VI, Pt. 2, p. 43; VIII, p. 202; X, p. 194; XII, p. 154; XIII, p. 205.

Ackers. One mile southwest of the Waterloo mine. Owner, Otto Ackers. Two-stamp mill run occasionally.

Baker Gold Mining Company (formerly Babby). T. S. Spaulding, Woodland, president; S. H. Baker, 1616 Eleventh street, Sacramento, manager. This group of two claims is in Secs. 24 and 30, T. 7 S.,

R. 20 and 21 E., 3 miles northwest from Coarse Gold; elevation 2300 feet (U. S. G. S.), on a branch of Cabin Creek. The claims were worked by Babby for about twenty years, during the course of which he sank several small shafts, one of which is down 70 feet. The gold, which is said to assay $19 per ounce, occurs crystallized, in quartz seams in the schist. The present company took over the claims in January, 1914, and is driving a crosscut tunnel to cut the ledge at 75 feet below the outcrop. In July it was in 250 feet.

Balfron (formerly Grand Central, Sunshine and Standard No. 2). One mile northeast of Coarse Gold, in Greaser Gulch, SE¼, Sec. 32, T. 7 S., R. 21 E.; owner, C. Melvin; unpatented; only assessment work done. Located seven years ago, but known and located for many years before. Present work on 6 to 12-inch vein opened by about 200 feet of cuts and shallow adits, with ore bearing considerable free gold. Alongside is a 3-foot vein of white quartz striking N. 70° W., dipping 70° NE.; country rock, schist.

Bibl.: R. XII, p. 164; XIII, p. 213.

Bazinet Group (formerly Morrow; includes Eliza Jane, Lawsuit, and Delia). Jas. Ryan and Pete Bazinet, owners. Near the Abbey mine at Hildreth, Sec. 30, T. 9 S., R. 22 E. The property has not been worked recently and the 5-stamp mill was removed. Vein width from 12 to 20 feet, and is said to have milled less than $10. A shaft about 270 feet in depth was sunk and several adits run.

Bibl.: R. X, p. 195; XII, pp. 154, 156, 159; XIII, pp. 206, 207, 210, 211.

Belle. Southern extension of Lucky Bill claim, Sec. 12 or 13, T. 7 S., R. 20 E., unpatented, prospect with shallow surface workings; ledge not developed. Owners, O. Bentley et al., Grub Gulch.

Big Stick. Unpatented claim on Quartz Mountain, near O'Neals; no equipment; 30-foot shaft on 2-foot vein; owner, W. H. Larew, Madera.

Boomer. Prospect, unpatented, near Grub Gulch; two shafts 60 and 80 feet deep; owner, Nels Anderson.

Butterfly. Near Grub Gulch, Sec. 23, T. 7 S., R. 20 E. Three unpatented claims (Butterfly, Bumble Bee, and Sunset). Owned by Mark Sullivan of Grub Gulch. Discovered in 1883; country rock, granite and schist; vein 18 inches to 4 feet wide; coarse N. 50° W., dip 50° NE. Recently several men have been employed on development work which is as follows: On the Butterfly claim four adits on vein. No. 1, 150 feet long with 200 feet of drifting and a 98-foot winze; No. 2, 500 feet long, 100 feet of drifts and 40-foot winze; No. 3, 160 feet long; No. 4, 200 feet long. On the Bumble Bee surface cuts. On the Contact, adit 300 feet long and 160 feet of drifting.

Bibl.: R. XII, p. 155; XIII, p. 206.

Caledonia. Situated 5 miles east of Grub Gulch. Recently relocated by O. B. Allen et al. Discovered 1895. Vein 12 inches wide in schist. Adit 350 feet, shaft 30 feet, drifts 40 feet.

Bibl.: R. XIII, p. 206.

Canary (Rex). Near Grub Gulch, on Bullion and Rex veins, patented. Owner, John Day, Grub Gulch. Bullion vein 3 to 18 inches wide, course N. 60° W., in schist; 1400-foot adit on ledge (into Jeff Davis claim). About 750 feet from the entrance, crosscut runs north 200 feet to the Rex vein upon which there are: 400-foot drift west and 100 feet east, besides a 100-foot winze and raise to the surface. A 2-stamp, triple discharge mill without concentrators and operated by a gasoline engine comprises the equipment. The reason stated for inactivity is lack of water.

Bibl.: R. XIII, p. 206.

Colorado. Two miles east of Coarse Gold, prospect only slightly developed. Owner, J. P. Lang.

Bibl.: R. XII, p. 155; XIII, p. 207.

Consolidated Four (see Waterloo).

Contention (see Bazinet).

Crystal Spring. About 2½ miles northeast of Grub Gulch. Five patented claims idle for many years. Owner, Wales L. Palmer, Golden State and Miners' Iron Works, San Francisco. Vein 2 feet wide in schist. Several old shafts 50 to 175 feet deep.

Bibl.: R. XII, p. 155, XIII, p. 207.

Daisy (formerly Handy Andy). Near Grub Gulch, on same vein as Canary, between Rex and Woodland, unpatented. Owner, John Day, Grub Gulch. There is a 500-foot crosscut adit and a 30-foot drift Assessment work only.

Daisy Bell (formerly Greaser Gulch). Near Coarse Gold. Adjoins Hawkeye on the northwest. Owner, Tom Jones, Jr. Discovered about twenty-five years ago. A shaft has been sunk 100 feet and at one time rich rock was worked in an arrastra.

Bibl.: R. XIII, p. 208.

Diana. Four miles south of Hildreth; Sec. 18, T. 10 S., R. 22 E., No work besides assessment. Several adits from 200 to 400 feet long. Owner, John McDonald, Friant.

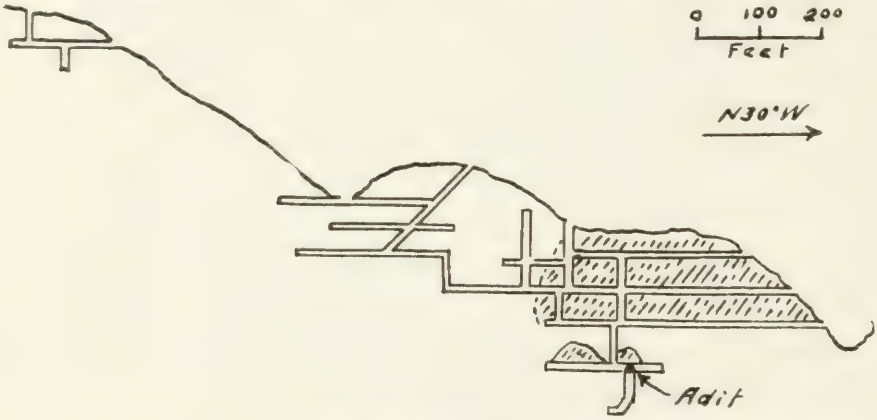
Bibl.: R. XII, p. 156; XIII, p. 207.

Eliza Jane. Prospect, included in Bazinet Group, possibly on extension of Bazinet vein. Sec. 25, T. 9 S., R. 21 E. Only work for many years is assessment.

Empire. Three miles southwest of Grub Gulch, patented. Owners, Lovely Bros. Narrow vein in granite. Worked part of time by arrastra.

Bibl.: R. XIII, p. 207.

Enterprise (one time called Fresno Enterprise). Situated in Sec. 12, T. 7 S., R. 20 E., about 3 miles northeast of Grub Gulch. Comprises 550 acres of patented land, including John W. Cates mine. Owner, Madera Enterprise Mines and Land Company, Lou R. Johnston, manager. The vein is in the bedding of schist or slate striking N. 35° W., dipping 80° NE. It is cut but not displaced by several granitic sills 2 to 3 feet thick, lying nearly horizontal. These are said to cause a slight enrichment on each side. The vein was discovered in 1881; development work, as shown on the accompanying sketch, was done within a short time after discovery and the property was idle until April, 1913.



ENTERPRISE MINE.
(From old drawing)

A 10-stamp mill, which once stood on the property, crushed, from June 1, 1881, to June 1, 1882, 8,257 tons, yielding $108,420 of bullion, assaying $19.05 per ounce, or an average value for the ore of $13.13 per ton. The present operators have erected a new 10-stamp mill, with 4-foot plates and no concentrators. A recent run of 1200 tons is stated to have recovered $13.65 per ton. Ten men were at work in July. Water from the Fresno River furnishes power except in the dry season when a gasoline engine is used. A turbine water wheel is used, operating under a 34-foot head with 650 cubic feet per minute. The stamps operate on a 6-inch drop with 7½-inch discharge and 96 drops per minute. Screens of 60-mesh are used. Capacity 18 to 24 tons per twenty-four hours. High water in January, 1914, took out the dam and flume on the river, causing considerable delay before they could be restored. There are 1½ miles of ditch and flume. A compressor running three drills is the mine equipment. All work is carried on through an adit.

Bibl.: R. XII, p. 156; XIII, p. 208.

Europa. Near Raymond. H. G. Kohlo and E. J. Harrah, Raymond, owners. Assessment work only maintained.

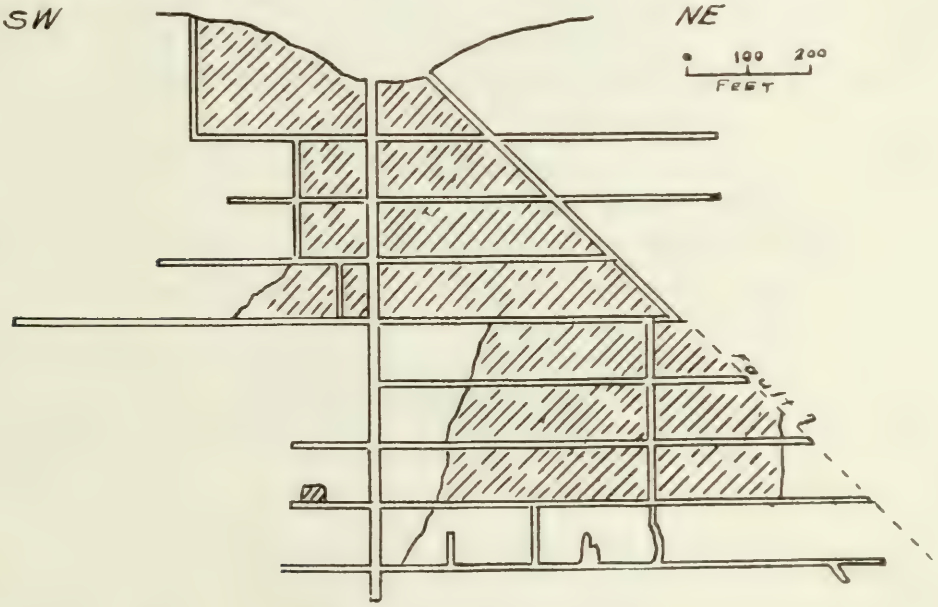
Bibl.: R. XIII, p. 207.

Five Oaks (includes Alpha). Situated 1 mile south of Coarse Gold, Sec. 9, T. 8 S., R. 21 E., on what is said to be an extension of the Waterloo vein, 3 feet wide, dipping 35° NE. Unpatented. Owner, John Quadt, San Francisco, and J. P. McFarland, Coarse Gold. Only assessment work has been done for some five years. An adit was run about 1000 feet and stoping carried up to the surface, about 200 feet. Equipment is a steam hoist and a 25-ton Huntington mill.

Bibl.: R. XII, p. 156; XIII, p. 208.

Flying Dutchman (see Hoboken).

Freda. Near Grub Gulch, adjoins the Gambetta. Unpatented. Owner, D. Ramsden, Grub Gulch. An adit 40 feet long and two shafts 20 and 25 feet constitute the development. Small production has been made from panning rich ore.



Gambetta Mine
(From Descriptions)

Gambetta (one time known as Arkansas Traveler). Situated ¼ mile west of Grub Gulch, in Sec. 15, T. 7 S., R. 20 E. Owned by the Madera Consolidated Mining Company, J. H. Lester, manager. The vein cuts across the bedding of slate or schist and into the adjoining granite coursing about N. 45° E., and dipping 78° SE. The accompanying sketch shows approximately the extent of old workings, as determined by descriptions. Enclosing schist strikes N. 50° W. and dips 40° NE. parallel to the contact with granite which lies to the southwest. Extension of the course of this vein and that of the Josephine, which strikes due east and west and dipping south, would intersect in the granite some 400 feet southwest of the new shaft. Croppings of both veins are traceable by holes sunk in the granite. The Flying Dutchman vein is still farther southwest.

The Gambetta was discontinuously operated from 1880 until 1904. Ore was crushed in a Huntington mill of 12 tons capacity per twenty-four hours. The total production is said to have been $490,000; ore averaging $33 per ton, and in 1903 a test run of 400 tons of old stope filling recovered $3.98 per ton, and 1700 tons of dump $2.38. Average width of vein is 2½ feet.

In 1910 the present operators sunk a 170-foot incline on the vein about 1000 feet southwest of the old shaft, drifted 250 feet southeast, partly between granite walls, and 160 feet northwest, and a shoot of high grade ore is reported. During the past year they cemented the shaft from 100 feet up, and on the 400-foot level have drifted 700 feet to get under the newer workings. They have also raised to the levels above from No. 2 shaft (the incline). No stoping has as yet been done in the new ground on the 400-foot. Except for three leasers driving an adit in the upper part of the mine, it has been idle since June 1, 1914. It is expected to resume on company account as soon as electric power is obtained.

The mill has at present two 5-foot Huntingtons and two Deister concentrators, giving an hourly capacity of 2½ tons. Water supply from the shaft (15,000 gallons per twenty-four hours) is said to be sufficient to mill only about 11 tons per day. Two boilers (50 h.p. and 80 h.p.) furnish power, oil fuel being used at a cost of $1.80 to $2.15 per barrel at the mine, depending upon the condition of the road from Raymond. It is expected that the San Joaquin Light and Power Company will enter the district with a line this year. A Norwalk compressor runs five 2¼-inch drills.

Bibl.: R. X. pp. 197–198; XIII, p. 208.

Golden Road (formerly Providence and County View). Possibly the north extension of Texas Flat vein. Four unpatented claims owned by C. Melvin, Coarse Gold. Adit 1300 feet long and three shafts 100, 200 and 300 feet deep. Average width of vein 5 feet.

Bibl.: R. VIII, p. 213.

Gold Metal and Gold Metal No. 1. Near O'Neal's. Mrs. Mary Arciniaga, Gilroy, owner. Assessment work only is done.

Hanmore (Lignus Asbestos). At Grub Gulch, unpatented, prospect. John Day, Grub Gulch, owner.

Hanover. Near O'Neal's, unpatented. Owner, George Williams, O'Neals. The vein is 20 inches wide and recently has been successfully worked in a small way for pockets. There is a 300-foot shaft and numerous short adits. A 5-stamp mill once stood on the property but was recently removed to a nearby claim.

Bibl.: R. VIII, pp. 204, 205; XII, p. 157; XIII, p. 208.

Hawkeye. Two miles northeast of Coarse Gold. Owner, J. P. Lang. Little work has been done recently. Two adits were run 250 and 350 feet long. A 5-stamp mill was at one time on the property, which is said to have produced about $25,000 from ore averaging $13 per ton.

Bibl.: R. XII, p. 157; XIII, p. 208.

Hazel. It is on the Fresno River near Raymond, and owned by A. C. Shaw of Raymond. Assessments only.

High Grade (formerly Washington). Two miles northeast of Coarse Gold in Deadwood Gulch, owner, Dan Long. Prospect on 2-foot quartz vein; shaft 26 feet deep. Small amount (20 tons) of ore recently milled at Texas Flat mill.

Hoboken (includes the Flying Dutchman). Situated 2 miles south of Grub Gulch (about Sec. 26, T. 7 S., R. 20 E.). Consists of ten unpatented claims, including the Flying Dutchman. Owners, Rice and Whittlesey, of San Francisco. A shaft and adit develop the ledge which is from 4 to 6 feet wide. About thirteen years ago some 400 tons of ore are said to have been put through a Bryan mill, at that time located on the property, and yielded $12 per ton. Assessment work has been done for a considerable time.

Bibl.: R. VIII, p. 213; XII, p. 158; XIII, pp. 208, 209.

J. M. Near Grub Gulch, unpatented claim, between Jeff Davis and Mammoth claims. Only workings are surface cuts. Owner, John Day. Abandoned.

Johnny. Near O'Neals, on Quartz Mountain, Sec. 4, T. 9 S., R. 21 E., portion patented. Owners, J. C. Albee and Geo. Lawrenson, who began their work about seven years ago. Adit on vein 140 feet, shaft 90 feet, vein 18 inches to 11 feet wide. An arrastra is on the ground and recently a small tonnage of ore was crushed.

Johnny Bull. Situated 2 miles northeast of Grub Gulch, between the Enterprise and Lucky Bill mines. Unpatented claim; owner,

J. D. Westfall; discovered 1895. Work consists of a 40-foot shaft and adit cutting vein at a depth of 40 feet. At one time a 5-stamp mill stood on the ground. It is said that some good ore has been produced, particularly a 9-foot incline which gave a total of $600.

John W. Cates. Portion of Enterprise property. A 60-foot shaft was once sunk and ore milled at the Enterprise.

Josephine. At Grub Gulch, Sec. 15, T. 7 S., R. 20 E., opposite the Gambetta mine, three patented claims. Owner, Risdon Iron Works, San Francisco. The mine has been idle and dismantled for many years. A 20-stamp mill was once operated. Vein 2½ feet wide, dip 55° to the south, strike nearly east and west. An incline shaft was sunk 555 feet and eight levels were run. A drawing and description are in State Mineralogist's Report X (1890), p. 203. It shows two shoots pitching east, from which it would appear that above the 325-foot level some 36,000 tons of ore were stoped. It is stated that the ore averaged about $10 per ton. There was a flow of 72,000 gallons of water per twenty-four hours.

Bibl.: R. VIII, pp. 213, 214; X, pp. 202, 203; XIII, p. 209.

Lady Ellen. Adjoins the Hoboken on the east. Four claims, agricultural patent. The vein is said to be an extension of the Hoboken. Years ago considerable surface work was done, the deepest being 60 feet. Ore was packed to arrastras. It is reported that ore left on the dumps assays $12 per ton. The property is under bond to McMicken and Rowe, who expect to begin operations.

Lawsuit (see Bazinet).

Lingo. Two miles northeast of Coarse Gold, in Swede Gulch; Scott Bufford, owner. Over 500 feet of adits have been run. It is reported that about ten years ago 200 tons of ore yielded about $12 per ton.

Bibl.: R. XII, p. 159; XIII, p. 210.

Little Bullion. Adjoins the Daisy Bell on the northwest; owner, David R. Jones. Discovered about twenty-five years ago. A 40-foot shaft and surface cuts have been opened. About a year ago 70 tons of ore were milled and reported to have yielded $22 per ton. It is near Coarse Gold.

Lucky Bill. Two miles northeast of Grub Gulch, SE. ¼, Sec. 12, T. 7 S., R. 20 E. Two unpatented claims (Syndicate and Safe deposit); owners, John Morrison et al., Grub Gulch. Discovered in 1880, but for the past three years only assessment work has been done. Workings consist of a 200-foot shaft and about 200 feet of drifting. The ore is in the form of a chimney or kidney, and is said to be 20 feet wide in the lowest workings. Ore was at one time worked in a 2-stamp mill and arrastra near the Enterprise. One run of 1000 tons is reported to have averaged $16 per ton. There is no machinery on the property and workings are full of water.

Bibl.: R. XIII, p. 210.

Magnet. Three miles northeast of O'Neals; Sec. 11, T. 9 S., R. 21 E.; unpatented claim. Owned for past ten years by R. W. Walker, who works it himself a part of each year. There are two adits 300 and 150 feet long and a shaft 100 feet deep. At one time there was a 2-stamp mill on the property. The vein is 2 feet wide and is reported to be rich in spots.

Mammoth (see Woodland).

Melvin, Mountain Lily, Mary. Near Coarse Gold, lying along the west side of and parallel to the Texas Flat property. Unpatented, discovered about 1899. Owner, C. Melvin. Vein material or stringers 60 feet wide, striking north and south, spots of good ore. There are six shafts from 60 to 240 feet deep and about 300 feet of drifting.

Bibl.: R. XII, p. 161; XIII, p. 211.

McKenzie-Minturn Mine. This is a drift mine on the north bank of the San Joaquin River, in Sec. 34, T. 10 S., R. 21 E., 3 miles northeast of Friant. Owners, A. H. McKenzie and W. Minturn, 806 Griffiths-McKenzie Building, Fresno. Both above and below this point on the south side of the river and above it on the north side, these placer gravels were worked between 1850 and 1860, the camp being known as Millerton, the county seat of Fresno County. The present workings were commenced in 1904. The ground is patented. The gravel is in an ancient river channel with a decomposed granite bedrock. The gravel, which is firm but not cemented, is 3 to 6 feet thick, and the bedrock runs about 28 feet below the surface of the ground. The channel is 5 to 6 feet higher than high-water mark of the present river, and has a different character of gravel, being coarser and made up of different rocks.

The main adit was driven in 700 feet and stoping began at the back end, the ground being allowed to cave behind the work. The bedrock shows three channels, the one farthest back from the present river channel carrying the best values. The gold is coarse, but without nuggets, the largest single piece found weighing only $3.20, and is stated to assay better than $19 per ounce. About 200 feet square of the 160 acres have been worked. The gravel is stated to average around $2 per cubic yard. The method of working is to stope out the gravel, fill behind with the coarse material and tram out the sand and small stuff to the sluices. Sixteen-foot sluices with Hungarian riffles are used. A 6-inch centrifugal pump driven by a 40 h.p. distillate engine furnishes water from the river. Two men are employed (August, 1914).

McLaughlin and Pearl. Situated between Johnny Bull and Enterprise mines. Two unpatented claims owned by Mrs. G. Wilson, Grub Gulch. Discovered about thirty-five years ago. There are several adits about 25 feet long, and a shaft 50 feet deep. Two years ago a little ore was hauled to Grub Gulch and milled, reported value about $20 per ton.

Millenium. Two miles west of Coarse Gold, about Sec. 1, T. 8 S., R. 20 E., unpatented. Owner, S. H. Baker. Discovery was made eight years ago and only work is a 40-foot shaft. The vein is reported 6 feet wide in granite. Work is to commence shortly.

Moonlight and Starlight. Three miles north of Enterprise mine near Crooks ranch. The starlight adjoins the Mammoth on the east, unpatented. Owner, Nels Anderson, Grub Gulch. Vein 20 inches wide in granite. Shaft 20 feet deep and 75 feet of drifting. A Huntington mill once on the property was removed two years ago.

Morning Star. Near Coarse Gold, in Deadwood Gulch. The land is now held under an agricultural patent by a Mr. Lea of Los Angeles. No work has been done for many years when several shafts 30 to 60 feet deep exposed a narrow vein.

Bibl.: R. XII, p. 161; XIII, p. 211.

Mountain View. Six miles northeast of O'Neals, Sec. 6, T. 9 S., R. 22 E. Five unpatented claims. Owner, John Davis. Only assessment work has been done for the past ten years. A number of shafts have been sunk from 50 to 100 feet in depth, and some drifts run. Arrastras and a nearby mill once treated ore reported to have yielded $23 per ton.

Bibl.: R. X, p. 198; XII, p. 161; XIII, p. 211.

Mud Springs (formerly known as Berry, also Wilson). Near O'Neals, about Sec. 26, T. 9 S., R. 21 E. Five unpatented claims. Owners, W. McKenzie Estate, and Jas. Mussel; office, Griffiths-McKenzie Building, Fresno. Average width of vein less than 2 feet. For the past two years the property has been idle, except for assessment work. It has been partly developed for more than 300 feet in depth. A Huntington mill of 20 tons capacity per day is on the property. It was formerly worked by T. Hart and J. Hoxie of Fresno, who took out $250,000. Mussel has recently found a new shoot of ore and will reopen the mine soon.

Bibl.: R. XII, p. 161; XIII, p. 211.

New Citizen (and Pure Gold). Near Coarse Gold, in Deadwood Gulch, unpatented. Owners, Marrone and MacLain of Fresno. On a vein supposed to be the same as the Balfron. Workings are 220-foot shaft, 279 feet of drifts and 39-foot crosscut. About ten years ago 200 tons were sorted and milled, reported yield being $36 per ton. Across 5 feet of formation it is said the ore will assay $4 per ton. Assessments.

Bibl.: R. XII, p. 161; XIII, p. 211.

Old Blue (or Gladiator). Six miles east of Raymond, about Sec. 33, T. 8 S., R. 20 E. Two unpatented claims. Owner, S. H. Baker, 1616 Eleventh street, Sacramento. Two veins in the granite, dip S. 35°. Reported amount of sulphurets 7 per cent. Three shafts 120, 275 and 150 feet deep and about 175 feet of drifts. Equipment consists of a 4 h.p. gasoline hoist. Until very recently from three to eight men have been employed in development work.

Paradise. About 1 mile west of Enterprise mine. Unpatented claim. Owner, Wm. Mose. Prospect only, from which owner is reported to occasionally obtain a little gold.

Patton. Two miles east of O'Neals; Sec. 22, T. 9 S., R. 21 E., unpatented. Owner, H. G. Patton of O'Neals. Some shallow workings have been opened during the past twenty years on an 18-inch vein. At one time a small amount of the ore was worked in the Standard mill.

Paymaster (see Waterloo).

Pure Gold Mining Company (Florence M). Dr. Topp of Raymond, owner. It is in Sec. 20, T 7 S., R. 21 E., about 3 miles north of Coarse Gold. Idle.

Quartz Mountain. Five miles south of Coarse Gold; Sec. 33, T. 8 S., R. 21 E. Several claims, some of which are patented. Owners, McN. Fenn, Nels & P. Anderson et al., Madera. Idle for many years. Formerly owned by a French company which vacated about 1906. The vein is up to 10 feet wide and has yielded some rich pockets. An incline was sunk for 250 feet, and a 60-stamp mill erected.

Bibl.: R. VIII, p. 210; XII, p. 162; XIII, p. 212.

Ragesdale. Seven miles southeast of Hildreth on the San Joaquin River, two unpatented claims. Until recently owned by J. W. Ragesdale of Taft; present owners, W. G. Walker, Friant, and Dr. Powers, Sanger. Several short adits were run and at one time a small mill was on the property. The present owners propose to clean out the lower adit and drive it ahead, then raise to the upper levels and stope, there being 300 feet of backs.

Savannah. One and a half miles southeast of Grub Gulch. Secs. 14, 23 and 24, T. 7 S., R. 20 E. Four unpatented claims, owned by Maxfield & Lizby, with Mark Sullivan of Grub Gulch, superintendent. There are three veins, but most of the work has been done on one which is 4 feet wide. On the Savannah No. 1 there is a 260-foot shaft and 300 feet of drifts. On the Savannah No. 2 there is a 160-foot shaft with 100 feet of drifts. On the Wide Awake is 120-foot adit and surface cuts. On the Joe claim is a 260-foot shaft with 300 feet of drifts, all of which are caved, and a new adit 200 feet long with 200 feet of drifts has been run below the old works. There is an old 10-stamp mill on the property in very poor condition from disuse. Several men have recently been employed in development work.

Bibl.: R. XII, pp. 158, 163; XIII, pp. 212, 213.

Standard. Two miles northeast of O'Neals, Sec. 14, T. 9 S., R. 21 E. Three unpatented claims. Assessment work done for owners by H. G. Patton of O'Neals. Operations ceased about eight or ten years ago. A 5-stamp mill is located about 2 miles distant on Fine Gold Creek. Workings consist of a 300-foot shaft and some drifting and stoping. The mill was operated for about six months. Width of vein 4 inches to 4 feet.

Bibl.: R. XII, p. 163; XIII, p. 213.

Starbuck (or Fine Gold). Three and one half miles northeast of O'Neals. Unpatented. Owner, F. F. Baker. Vein 6 inches wide. Shallow surface workings by the owner have furnished ore for occasional runs by arrastra.

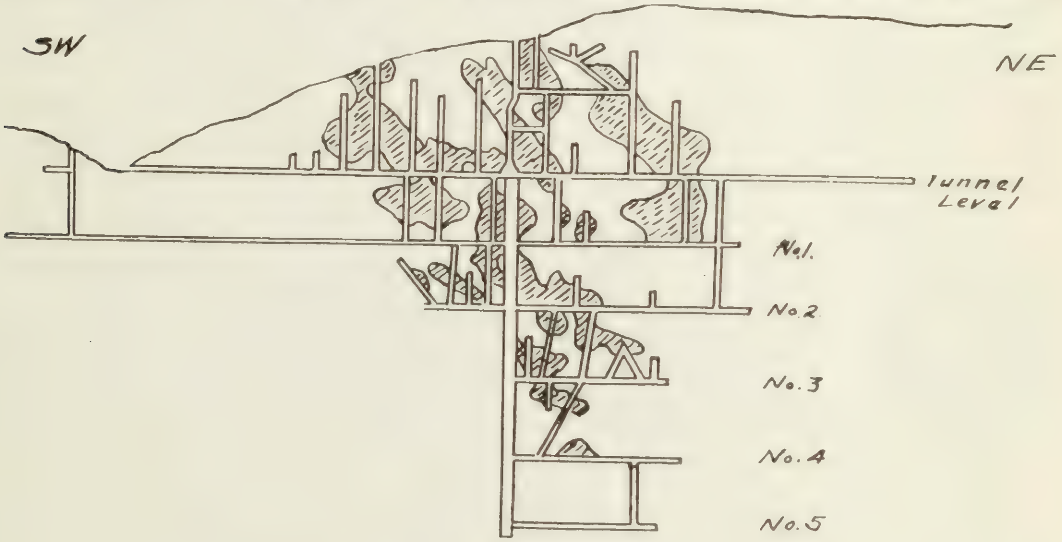
Bibl.: R. XII, p. 164; XIII, p. 213.

Starlight Group (one time called Mammoth). At Grub Gulch. Three unpatented claims owned by John Anderson. Recent work has been simply assessment. There is an old shaft; at the 50-foot level is a crosscut 150 feet north with drifts 150 feet west and 25 feet east; at the 200-foot level is a 50-foot drift west, and at the 340-foot level drifts 50 feet east and 50 feet west with a crosscut 15 feet north towards the hanging-wall. The vein outcrops for 15,000 feet or more, striking N. 70° W., dipping 45° NE. The width is 20 to 25 feet. About 1896 a 10-stamp mill was erected by an English company, the mine having been developed as above described. Operations continued only a short time.

Bibl.: R. XII, pp. 160, 162; XIII, pp. 210, 212.

Sunshine (see Balfron).

Texas Flat. Situated in Sec. 6, T. 8 S., R. 21 E., 1 mile northwest of Coarse Gold. Consists of four patented claims, discovered in 1853. Owner, Ed. Dickinson, of Kansas City. Under option to Phillip Rowe, of Seattle, who has been operating since 1912. Wm. Krohn is superintendent. The vein varies in width from 3½ to 4 feet, strikes with the bedding of enclosing slate, N. 40° E., and dips 30° SE. An adit 1400 feet along the vein meets the 920-foot incline shaft at a point 260 feet below the collar. The workings are shown by the accompanying sketch copied from the mine map. The mine has been thoroughly equipped for about ten years. An electric power plant stands on the Fresno River about 3 miles distant. Water has 110 feet fall and generates 110 horsepower. An electric hoist is stationed at the tunnel level of the shaft. The mine is practically dry and water is ordinarily handled with skips. There is a compressor capable of running four drills. The mill has 20 stamps (1500 pounds) and 4 Wilfley tables. Capacity 120 tons per day. Since 1904 the mill operated four or five seasons from November until July when waterpower fails. In January of this year (1914) high water in the Fresno River took out their flume and damaged the power house, for which reason the mine is at present idle. Operations will be resumed, however, as soon as the San Joaquin Light and Power Company gets a line into the district.



TEXAS FLAT MINE
ON PLANE OF VEIN, DIP 30°

The total production since 1903 is said to be $185,000, the ore averaging $4 per ton. Amount of concentrates ½ per cent, value $98 per ton, bullion fineness .555. It is said that ore has been stoped and milled for $1.40 per ton. Recent work has been on a footwall ledge at No. 3 level, where some ore of $20 to $50 in value is said to have been encountered.

Bibl.: R. VIII, p. 212; XII, p. 164; XIII, p. 213.

Thrower. Near O'Neal's, Sec. 9, T. 9 S., R. 21 E. Owner, Hayden Payne, of O'Neals. The vein is 2 feet wide between granite walls, and is said to average $8 per ton with rich spots. A 90-foot shaft has been sunk but only assessment work has been done recently. A small tonnage of ore is occasionally treated in an arrastra.

Ten Strike (formerly McLellan). Adjoins Hawkeye on the southeast; owner, J. P. Lang. Discovery made about twenty years ago. Vein 1 to 5 feet wide. A shaft 60 feet deep and some surface cuts have been opened. No ore has been milled. Assessments.

Topps (see Pure Gold Mining Company).

Volcano No. 1 (also called Hildreth). At Hildreth, Secs. 25 and 26, T. 9 S., R. 21 E.; patented. Owner, Wm. Dumphrey Estate. The vein is about 12 inches wide, and the last work, some twenty years ago, opened it to a depth of about 400 feet. This is the only property which has been extensively operated in the vicinity. At one time it had a steam hoist and Huntington mill and is reported to have produced about $100,000 from pockets.

Bibl.: R. XII, p. 158; XIII, p. 209.

Washington. Two miles south of Grub Gulch. Two unpatented claims; owners, John Anderson et al. The vein is 2 inches to 2 feet wide in granite. There are four shafts, 60 to 140 feet deep, and 100 feet of drifting. Assessments only at present.

Bibl.: XII, p. 164; XIII, p, 214.

Waterloo (Paymaster) *and Consolidated Four.* Four miles southeast of Coarse Gold, Sec. 15, T. 8 S., R. 21 E.; owners, H. A. Krohn et al., Coarse Gold. The Waterloo group consists of two patented claims, the Paymaster and Alpha No. 2. The Consolidated Four group is composed of four unpatented claims which adjoin the others on the northwest, all being in the same line. They are on the north fork of Fine Gold Creek, at an elevation of 2300 feet (U. S. G. S.). On the Waterloo group two parallel veins 40 feet apart strike northwest and southeast and dip 30° NE. Each vein is about 3½ feet wide and they are reported to average $10 per ton.

In 1901 an incline shaft was sunk 300 feet; an adit 400 feet long runs to the 75-foot level on the southeast side; 45 feet below the adit level a drift runs northwest 250 feet; at 90 feet below the adit drifts run southeast 150 feet and northwest 200 feet; 200 feet below the adit drifts extend each way for 200 feet. A little stoping was done and during six months' milling it is reported that $30,000 was produced. Values are principally in free gold, with some galena and pyrite. A 10-stamp steam-driven mill is on the property, unused for nine years.

The electric power line of the San Joaquin Light and Power Company now (July, 1914) crosses the property near the mill. On the lowest level a run of 300 tons is said to have averaged $8.60 per ton. Last winter high water exposed a new vein in the creek bank on the Alpha No. 2, which has been traced through the full length of both claims. It is stated that a Canadian company is now considering a bond on the property. The four unpatented claims have been opened by several shafts from 10 to 50 feet deep.

Bibl.: R. XI, p. 216; XII, p. 161; XIII, p. 211.

Willow Creek. It is 2½ miles south of O'Neals; unpatented. Owner, Chas. O'Neals. Discovered thirty years ago but only assessment work done for the past ten years. The vein is 6 inches to 5 feet wide, said to average $13 per ton by arrastra. A shaft was sunk 60 feet (now full of water) and 50 feet of drift run, besides a 90-foot adit.

Bibl.: R. XIII, p. 214.

Woodland (also known as Mammoth). Near Grub Gulch, unpatented. Owner, John Day. Adjoins the Handy Andy, on the same vein as the Daisy, known as the Bullion vein, which is 3 to 4 feet wide. An adit 140 feet long and 90 feet of crosscut. Ore said to average $5 per ton. Last winter (January, 1914) a new shoot was found, but work was stopped by heavy rains causing the ground to cave. It is intended to reopen this fall.

Bibl.: R. XII, p. 160; XIII, p. 210.

Zebra (U. B. Dam No. 1). Near O'Neals, unpatented. Owner, Wm. Rucker, San Jose. Only assessment work has been done for many years. The vein is about 18 inches wide, striking northeast and southwest and dipping 40° SE. State Mineralogist's Report, 1890, page 199, gives the following information: Four adits on the vein at vertical intervals of about 50 feet, their lengths being 640, 460, 510, and 583 feet, and a 100-foot shaft near the lowest adit. Considerable stoping was done, one shoot being developed for a length of 120 feet, and two other shoots partly determined. A Bryant roller mill of 18 tons capacity was operated for a time, but removed about fifteen years ago. Mining and milling is said to have cost $2.10 per ton; and the ore to have averaged $15 to $20 per ton.

Bibl.: R. VIII, p. 210; X, p. 199; XI, p. 216; XIII, p. 214.

Zulu. Near Coarse Gold. A prospect formerly owned by David R. Jones, now abandoned. Work consists of a 30-foot shaft and 60-foot drift, besides surface cuts. About 5 years ago 100 tons of ore were milled.

IRON.

On the western slope of Mt. Raymond, Sec. 9, T. 5 S., R. 22 E., there has been considerable prospecting in recent years for iron. Near the summit of the mountain is an adit about 50 feet long, showing irregular spots and seams of magnetite and pyrite 2 feet to 3 feet wide. The country rock is a siliceous metamorphic showing considerable red iron stain and some smaller spots of leached iron ore. Three unpatented claims (Bathse, Summit, and Blue Bell) located about twenty years ago comprise the property owned by *Thomas Biledo,* of Fresno Flat.

In the same locality, but farther south near the base of Mt. Raymond, a number of shallow shafts have been sunk by *H. A. Krohn* of Coarse Gold. Geologic conditions are similar to those on the Biledo property, except that soil covers a great deal of this land. Some bodies of magnetite and other iron ores are exposed, possibly being in the form of lenses as much as 4 or 5 feet thick and 50 to 100 feet long.

Farther east, about Secs. 14, 15, 22 and 23, T. 5 S., R. 22 E., similar geologic conditions prevail and many shallow pits and shafts have been sunk by *T. G. Hart* of Fresno.

Yosemite Copper Mines Company. George J. Main, superintendent, Hayward. This company has done considerable work at Hogum in the vicinity of Iron Creek, Sec. 14, T. 5 S., R. 22 E., and Sec. 7, T. 5 S., R. 23 E. The property consists of nine claims and a mill site which have been surveyed for patent. Five adits from 40 to 100 feet in length have been run, besides numerous smaller surface workings. On the claims in Sec. 14 six core-drill holes have been sunk from 30 to 225 feet. Geologic conditions as described nearer Mt. Raymond prevail here except that on this property there is more granite or granodiorite. The drill cores are said to show a thickness of from 50 to 100 feet of ore, which seems to be principally magnetite, white iron sulphide, and pyrite. But little copper stain from sulphide or carbonate is seen. It is stated that assays of the entire cores were not made. The cores have been preserved. Outcrops near the drill holes do not indicate a continuous ore body and lack of evidence as to dip prevents definite statements as to extent.

Some idea of hardness of the rocks may be conveyed by the rates of drilling with a Davis Calyx 3⅛-inch machine using chilled steel shot. They are said to have averaged as follows: Granite, 6 to 10 feet per day; ore, 4 to 6 feet; quartzite, 2 to 3 feet.

Transportation facilities to the district are poor, the nearest railroad point being Raymond, about 30 miles distant. Heavy snowfall prevents work for from four to six months a year. There is a fair water supply, and excellent timber covers most of the territory.

Bibl.: R. X, pp. 191-193; XI, p. 214; Bull. 38, p. 298.

THE MINARET IRON DEPOSIT.

By F. B. WEEKS.

A reconnaissance examination, by the writer, of all reported iron deposits in California showed the largest to be in Madera County. This iron deposit occurs at the south end of the Minaret range which constitutes one of the prominent ridges of the Sierra Nevada in the northeast corner of Madera County. The region is characterized by Alpine ruggedness and contains many glacial amphitheaters and lakelets. It is drained by the North and Middle Forks of the San Joaquin River which have cut canyons 3,000 to 4,000 feet below the general level of the Minaret ridge, which separates these streams. Figure A shows the topographic features of the country. This photograph was taken from

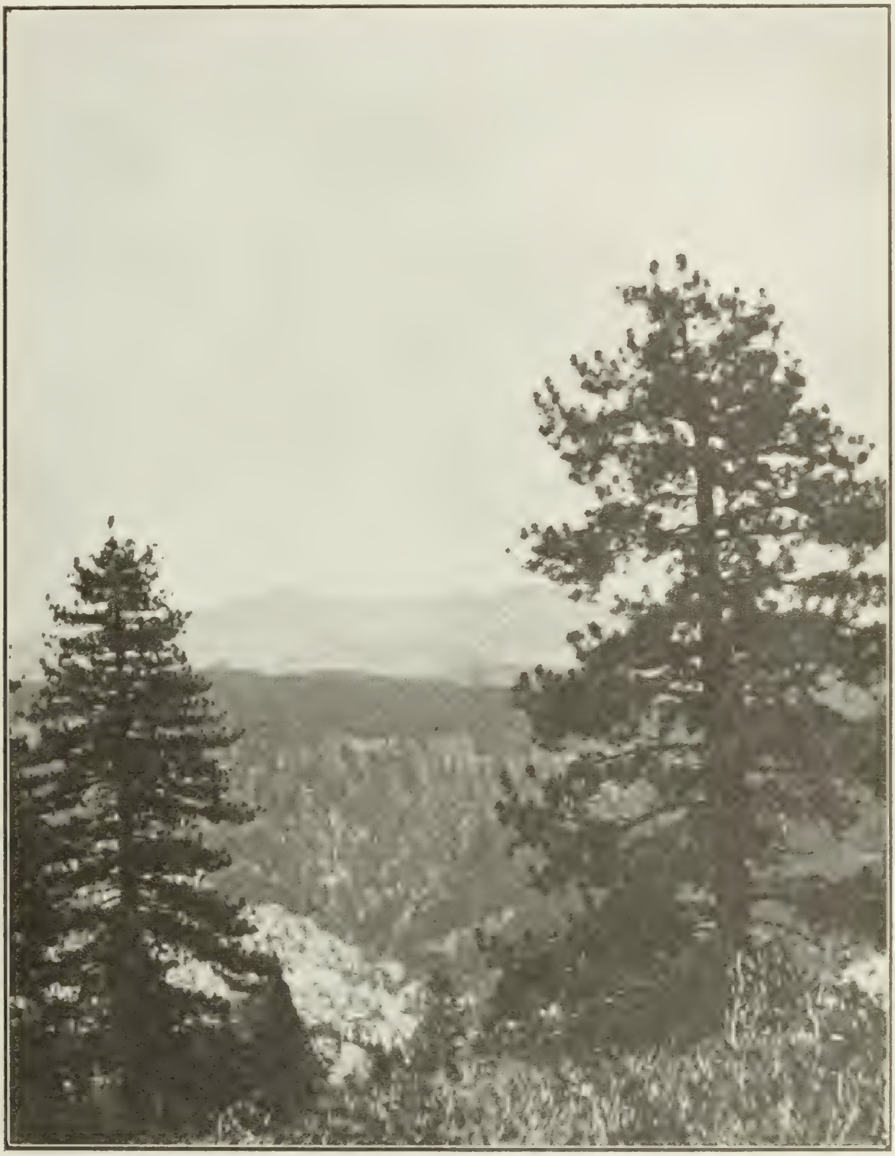


Fig. A. Southern end of The Minarets, looking from the west. Peak at left of center is Iron Mountain. Photo by F. B. Weeks.

the ridge on the west side of the North Fork looking east to the southern end of the Minaret range. The peak at the left of the center of the picture is Iron Mountain.

A mountain wagon road has been constructed from Fresno Flats to Jackass Creek and from this point there is a trail used by cattle men which crosses the North Fork on a bridge known as Sheep Crossing and thence to "77" Corral. From "77" Corral there is a trail leading north to Iron Mountain. From the east the deposit may be reached by wagon road from the town of Bishop in Owens River Valley to Mammoth, and thence by trail over Mammoth Pass and crossing the Middle Fork near the Devil's Post Pile and to "77" Corral. These roads, trails and localities are shown on the topographic maps of the U. S. Geological Survey of this region and these maps should be in the hands of every person going into this country. The only persons in the region are a few prospectors and cattle men in July, August and September. The remainder of the year the country is uninhabited. The winters are long and severe and the snowfall heavy.

There is considerable timber in the region but the iron deposit is 1500 feet or more in elevation above timber line. The North Fork would afford water power for any mining or milling operation in this region.

A preliminary railroad survey was once run through this country by way of Mammoth Pass. A railroad from the west would traverse a rolling country rising gradually to the east as far as the ridge on the west side of North Fork. From this point construction and operation of a railroad would meet with the usual difficulties encountered in the high Sierras.

This iron deposit has been known for many years. It has been briefly described, usually in exaggerated terms, in various mining papers and is mentioned in some of the reports of the California State Mining Bureau. It should be remembered that it has only been within a few years that the nature and origin of iron deposits of this character have been sufficiently understood to expect a reasonable description from persons who have personally examined this deposit.

From "77" Corral up the trail to the foot of Iron Mountain the country rock is the grano-diorite characteristic of the high Sierra. Upon the southern slope of Iron Mountain, there is a variety of igneous rocks, from very acid to basic types, the different types occurring in belts having a general N. 30° E. strike. The contact between the iron deposit and country rock is usually covered but where observed the line of demarkation between them is sharp and distinct.

However, some large pieces of slide rock show banding of iron with both acid and intermediate rocks indicating a probable intermingling of materials about the edge of the iron mass. On the northwest side of the deposit the contact rock is of light gray color of an acid type while rocks of an intermediate character are in contact with the iron at other points.

There are no indications of movement at any of the observed contacts. Fracturing in a northeasterly direction, parallel to the strike of the deposit, is strongly developed through the iron mass. Figure B shows the portal of a tunnel that is entirely within the iron mass and the fracturing characteristic of the deposit is here strongly developed. The fracturing is subsequent to the formation of the ore and may be wholly due to shrinkage of the mass prior to its complete consolidation. In certain narrow belts of the associated igneous rocks schistose structures are developed. No flow structures were observed. The slopes of Iron Mountain are covered with slide material composed of the igneous rocks and iron from the deposit.

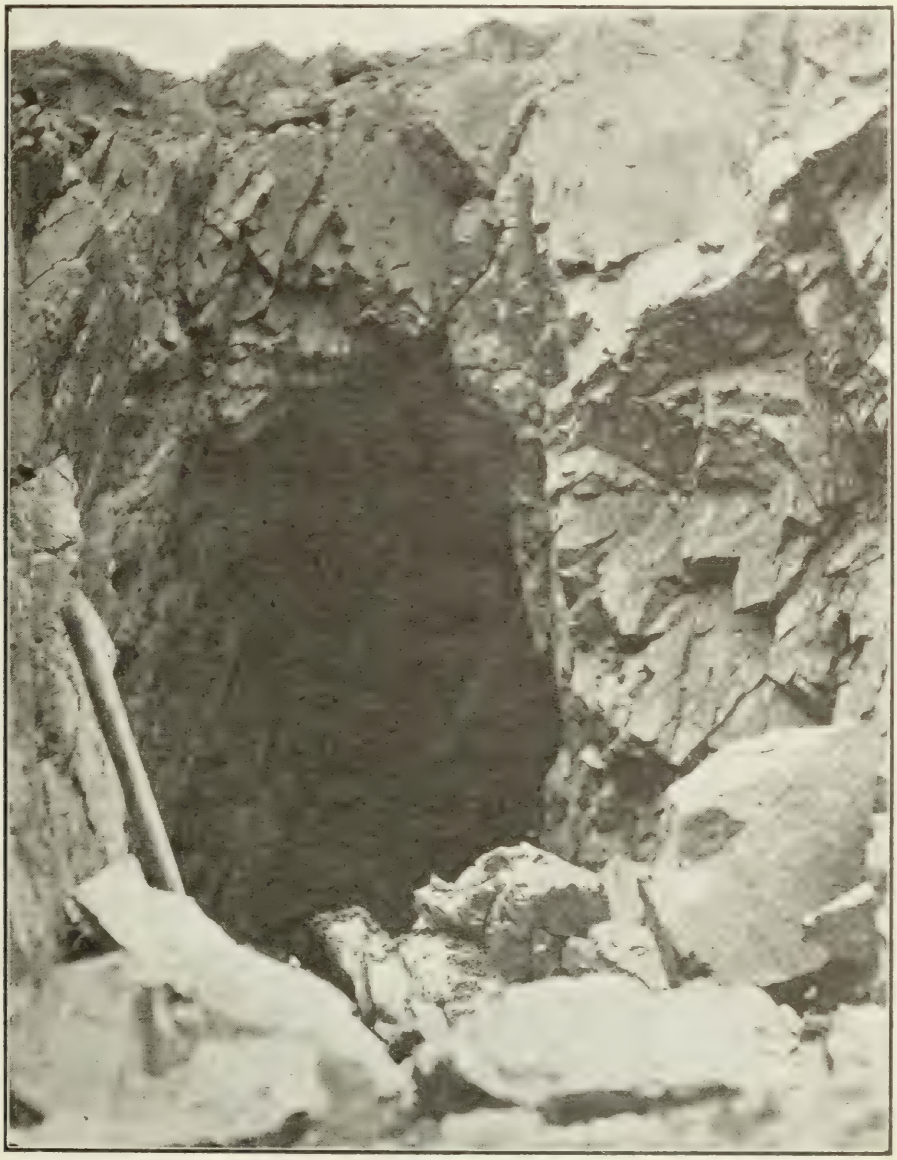


Fig. B. Portal of tunnel in massive iron ore on Iron Mountain.
Photo by F. B. Weeks.

The deposit is a mass of iron composed of magnetite in which no other material was observed. Its strike is NE.–SW., and its elevation about 11,000 feet above sea level. On account of the slide rock no accurate determination of the surface extent of the deposit could be made. It was estimated to be 2000 feet or more in length, 400 feet in average width, and by erosion on the northeast end it was shown to be 250 feet in depth. On the basis of these estimates there should be thirty million tons of iron ore available. Development may show a greater amount.

The general aspect of the iron mass and the enclosing rocks point to its origin in the differentiation and segregation of materials within the original igneous magma and their consolidation in the form now exposed by erosion. An analysis of a sample taken from the face of a tunnel gave: Fe, 64.14%; Al_2O_3, 1.52%; CaO MgO, 0.53%; SiO_2, 8.60%; P, 0.72% Cu, none; S, 0.60%.

The deposit is within the Sierra National Forest Reserve. It was reported that the deposit is claimed by parties who have made mineral locations. There being no persons in the region at time of examination the names of the present locators could not be ascertained. Approximately 100 feet of underground development work was found within or in close proximity to the iron deposit.

LEAD AND SILVER.

Star Mine. Situated near the summit of Mt. Raymond, NE. ¼, Sec. 10, T. 5 S., R. 22 E., at an elevation of 9000 feet. About 1888 this property was slightly developed, and a concentration plant was erected about 1½ miles distant, near the center of Sec. 16, T. 5 S., R. 22 E. An aerial tramway connected the mine and mill. The intention was to work the ore for its silver and lead content, but the project was a failure after about one year of operation. Very little information is to be had. The plant is at present in a very bad state of repair. About seven years ago an attempt was made to again work the property. It is stated that such ore as was milled contained about 10 per cent of concentrates, valued at $40 per ton and occasionally as high as $100. H. A. Krohn, of Coarse Gold, is the present owner.

Bibl.: R. VIII, pp. 215, 216.

Silver-Lead ores are found in the North Fork Mining district in T. 3 and 4 S., R. 25 and 26 E., but little work has been done of recent years.

Bibl.: R. XI, pp. 218-223.

MINERAL WATER.

There are several soda and sulphur water springs, both cold and hot, near Isberg Pass and the Devil's Post Pile in the extreme eastern end of the county. They are not utilized, however, except by occasional camping parties. Of the hot springs, the most important are the "Red Meadows Hot Sulphur Springs" at the Devil's Post Pile; temperatures 90° to 120° F.

Bibl.: U. S. G. S. Water Supply Paper No. 338, pp. 55, 238, 239, 240, 241, 381.

MOLYBDENITE.

A small deposit of molybdenite was found near the sawmill of the Madera Sugar Pine Company, at Sugar Pine, and some development work done. The deposit proved to be too small. It was said to carry small values in gold.

NICKEL AND COBALT.

H. A. Krohn of Coarse Gold has 80 acres under an agricultural patent in Secs. 23 and 26, T. 10 S., R. 19 E., 12 miles northeast of Madera. While developing for supposed copper values, a body of pyrrhotite ore was opened up, said to assay 7 per cent nickel and 14 per cent cobalt. Development consists of a 100-foot shaft and a short crosscut. No commercial production has as yet been made.

SILVER (see Lead and Silver).

SOAPSTONE.

Brown Deposit. On the north side of the San Joaquin River, a short distance above Friant. Owner, George Brown, Friant. D. Evanger and G. D. Hutchinson, lessees, 3480 Tulare avenue, Fresno. This deposit of talcose schist has been known for twenty-five years, but not utilized except locally. There is a belt of the material about 400 feet wide, striking northwest. Only a small quarry face has been opened up. It is not high grade, but can be sawed into blocks several feet across.

STONE INDUSTRY.

The well known "Raymond" granite quarries near Raymond, in Madera County, not only are and have been for a number of years the most important mineral industry of the county, but they are also an important factor in the state's production. As has already been noted (see Introduction), these deposits of workable building stone are located in the western edge of the Sierra foothills. There are two quarries about 1 mile apart, on the east side of a small valley, about 2 miles east of Raymond, which is the terminus of the Berenda-Raymond branch of the Southern Pacific Railroad. Both quarries are served by spur tracks

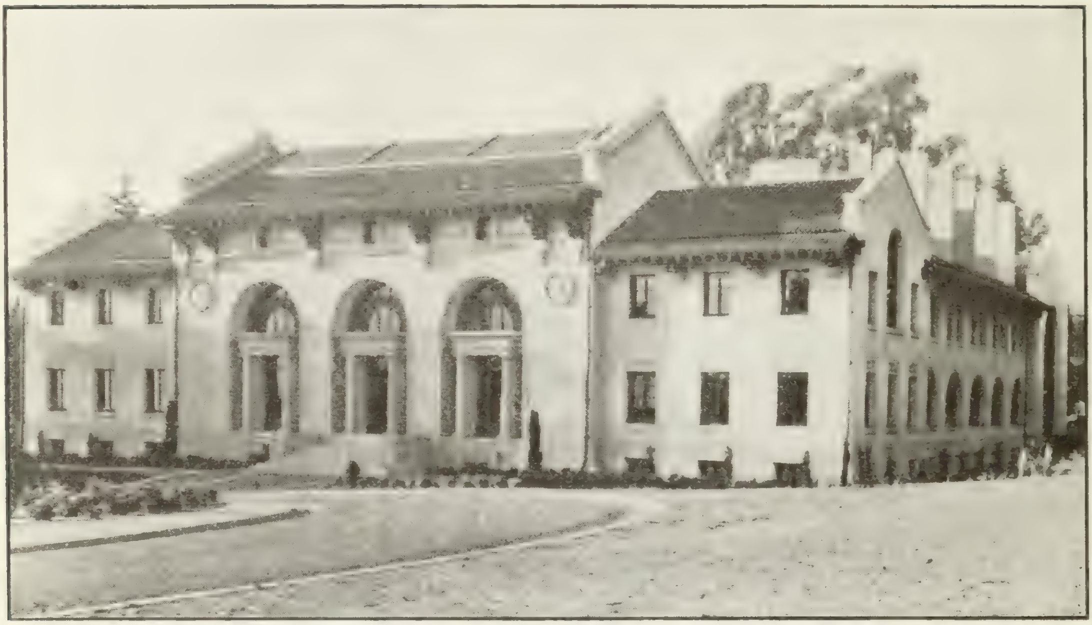


Photo No. 123. Hearst Memorial Mining Building, University of California, Berkeley. Raymond granite (1903).

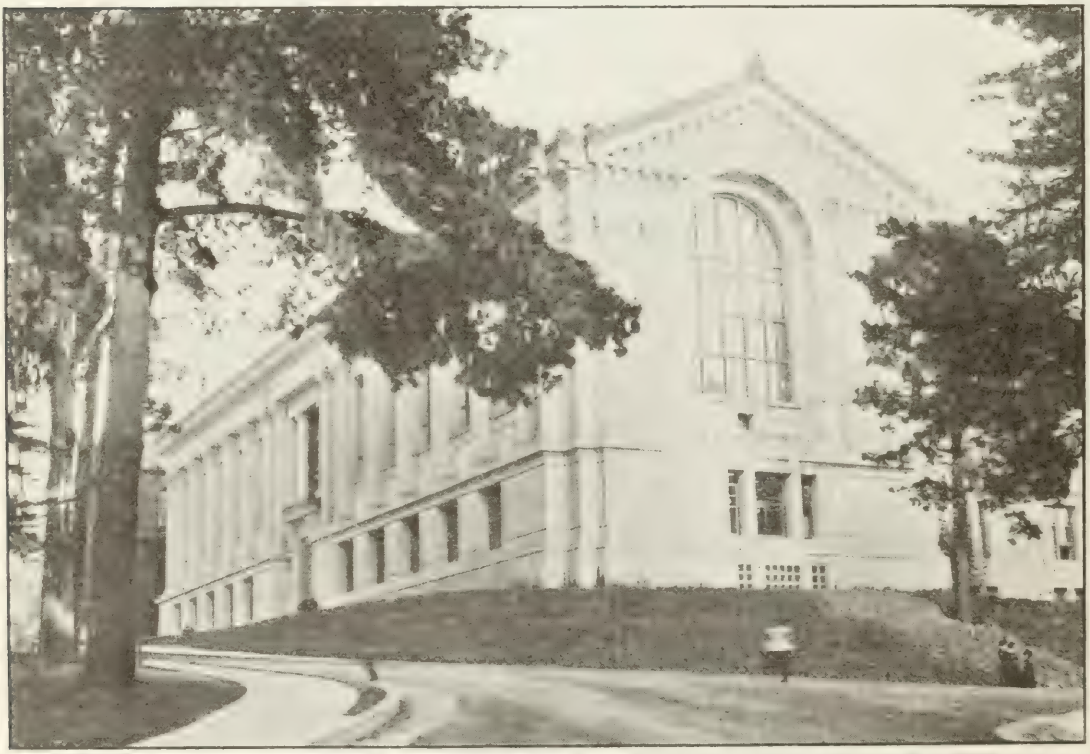


Photo No. 126. University Library, University of California, Berkeley. Raymond granite (1912).

Photo No. 6. Dressing a platform stone (size 21 feet by 6 feet by 2 feet) for the San Francisco City Hall. McGilvray Raymond Granite Company, Madera County, Cal.

Photo No. 8. Sculptural Carving (plaster model at right), for San Francisco City Hall. McGilvray Raymond Granite Company, Madera County, Cal.

from this branch line. It is now recognized that this stone is not excelled by any other building granite found either in this state or elsewhere. It is noted for its beautiful white color, the fineness and uniformity of its texture, its weathering qualities, and its freeness in working. As to this last named feature, it lends itself readily to all classes of fine structural carving.

Madera County Rock Crusher. The county has a rock crushing plant at the McGilvray quarry to utilize waste rock and spalls for road material. It is under the supervision of H. L. Craw, supervisor. Idle in 1914.

Photo No. 129. Sculptural detail on City Hall, San Francisco. Stone from McGilvray Raymond Granite Company, Madera County, California.

McGilvray Raymond Granite Company (formerly McClellan Quarry). John D. McGilvray, president; office, 634 Townsend street, San Francisco; Alexander McGilvray, superintendent at the quarry. Situated in Sec. 27, T. 8 S., R. 19 E. The rock is similar to that described in the Knowles quarry, except in the manner of natural fracturing. Here, no large exfoliation planes have as yet been exposed; but cross fractures some 20 to 30 feet apart occur, besides occasional small dikes. The quarry is a side hill cut worked on about the same scale as the other, but covering a smaller area and deeper. Equipment includes 6 derricks with oil-burning steam hoists, 2 saw sets, 4 overhead traveling cranes on two runways, and a locomotive track crane. The two compressors are driven by 150 h.p. and 250 h.p. motors, electric power being obtained from the line of the San Joaquin Light and Power Company, installed this year (February, 1914). Most of the work is done with pneumatic tools.

This summer the quarry has been employing from 250 to 300 men, the largest force in its history. This is mainly due to their furnishing the stone for the new San Francisco City Hall, the granite contract alone for which represents a value of $991,313. The architectural plans call for a large amount of fine sculptural detail, and this work is practically all done at the quarry sheds. In this department there were seventeen carvers working under a special foreman. The majority of these artists (for ''artists'' they must be to do such work) are Italians and Scotchmen. Among the larger blocks finished are several platform pieces for the City Hall, 21′ x 6′ x 2′. (See photo No. 6.)

The product has an extensive market, another example being the United States Custom House in San Francisco. The four monolithic Doric columns at the First National Bank are also from this quarry. The largest single piece shipped from this quarry was 14′ x 13′ 10″ x 2′ for the top of a mausoleum in Cypress Lawn Cemetery, San Mateo County.

Bibl.: R. XII, p. 384; XIII, p. 620; Bull. 38, p. 32.

Raymond Granite Company (also known as the Knowles Quarry). F. E. Knowles, president; office, Division street and Potrero avenue, San Francisco; F. J. Krebs, superintendent at the quarry. Situated in Sec. 22, T. 8 S., R. 19 E. Operations have continued since 1888 with varying activity, there being at present (July, 1914) 175 men employed about the entire plant. The company owns some 1700 acres. About 5 or 10 acres are free of weathered overburden on a low rounded hill (see panoramic photo No. 4A). The rock breaks to extensive fractures lying nearly parallel to the ground surface and from a few inches to 15 or 20 feet apart. Cutting of these immense slabs is done principally by wedges with a little powder used occasionally. A channeling machine is also employed. (See photos Nos. 1, 2 and ''M''.)

The largest single piece reported was 4′ x 4′ x 40′, but much larger blocks could doubtless be obtained. The stone is completely dressed or carved at the sheds adjoining the quarry, where air-driven machines are used. The equipment includes 6 derricks with oil-burning steam hoists, 2 sets of saws, and overhead traveling electric cranes (3 large and 2 small). Until February of this year oil has been used to generate power, since which time the San Joaquin Light and Power Company has been furnishing electricity. The steam plant is still maintained as an auxiliary. The stonecutters receive $5 per day for eight hours.

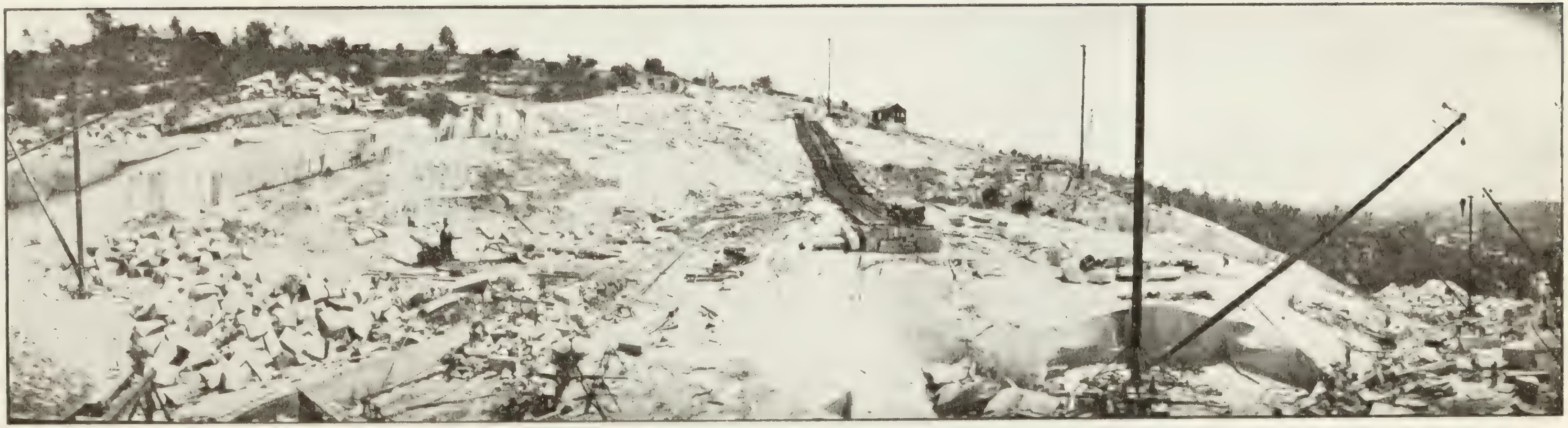


Photo No. 4A. Raymond Granite Company's quarry near Raymond, Madera County, California. Panoramic view of quarry from below.

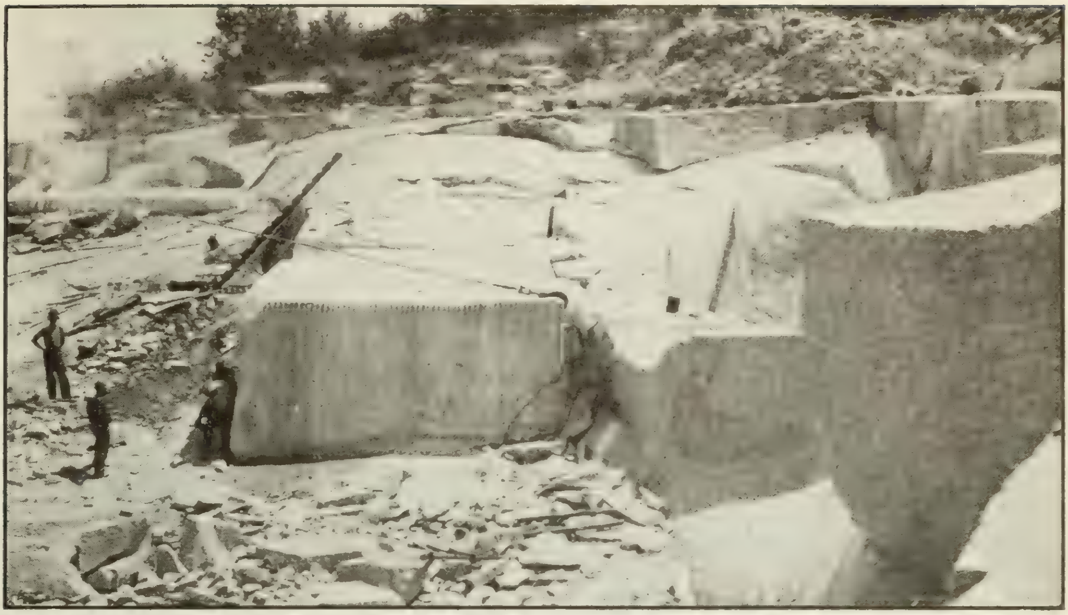


Photo No. 1. Raymond Granite Company, Madera County, Cal. Upper part of quarry.

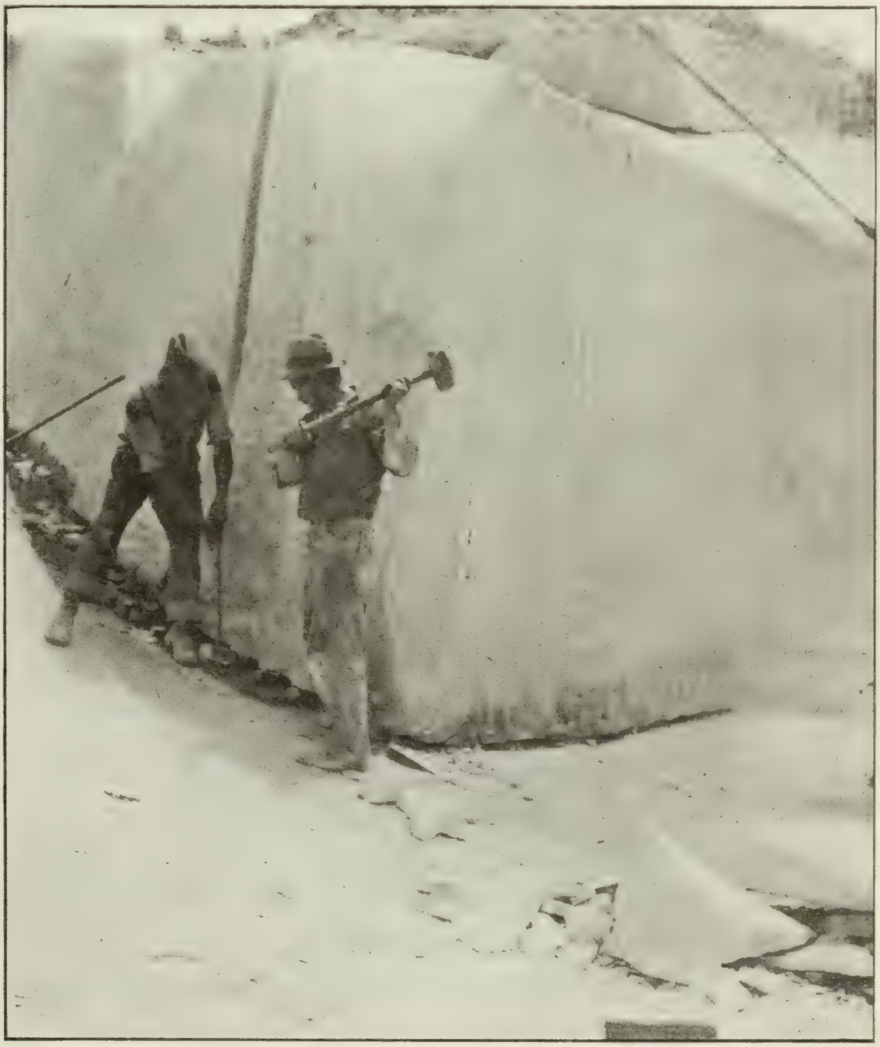


Photo No. 2. Wedging out a large block of granite (about 10 feet by 20 feet by 5 feet). Raymond Granite Company, Madera County, California.

Monumental and building stone has been furnished to many large structures, among which may be mentioned the San Francisco post office, Municipal Auditorium, the U. S. Sub-Treasury Building and the Fairmont Hotel; also for buildings at the University of California in Berkeley. Of the latter, the most striking example is the Campanile, or bell tower, a shaft of 34 feet square base and 305 feet in height to the top of the surmounting bronze lantern. On the front of the new U. S. Sub-Treasury Building in San Francisco are ten Doric columns about $4\frac{1}{2}$ feet in diameter and 27 feet long, each in three sections. As originally drawn, the specifications called for these columns to be monolithic. The change was made because of the greater cost of handling. As has already been pointed out even larger monolithic pieces than that can be obtained here. We were informed that the cost of cutting would be practically the same, but that the necessity of providing heavier equipment to handle them would have increased the cost $2000 for the ten columns in question, or $200 per column. It seems to the writer that it would have been money well spent, for the beauty of the building would have been enhanced many times.

Photo "M". Raymond Granite Company's quarry, Raymond, Madera County, California.

Bibl.: R. X, p. 189; XII, p. 384; XIII, p. 620; Bull 38, pp. 30–32.

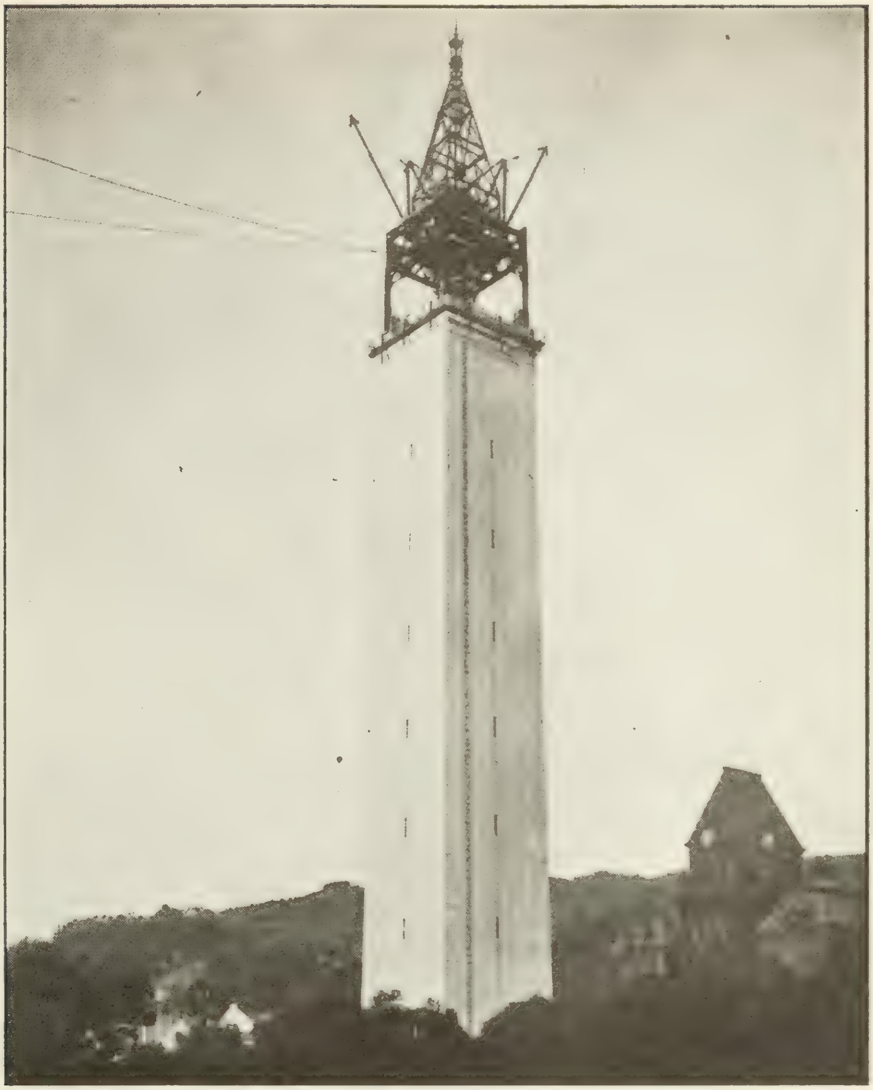


Photo No. 125. Sather Campanile, University of California, Berkeley. Stone from Raymond Granite Company, Madera County, California.

Sand and Gravel.

Primmer Artificial Stone Plant. B. J. Primmer of Madera has a plant which is producing concrete pipe and culverts. California cement is used with sand and gravel obtained from the Fresno River north of Madera.

Santa Fe Gravel Company (formerly San Joaquin River Rock and Gravel Company). F. Knobloch and Louis Manuel, owners, 1929 Fresno street, Fresno. This gravel pit on the San Joaquin River, in Sec. 32, T. 12 S., R. 19 E., is 1 mile north of Herndon station on the Southern Pacific railroad, but ships via Knobloch spur on the Santa Fe. It was opened up about 1904. The material is moved by Fresno scrapers to a trap over dump cars; then hauled $\frac{3}{4}$ mile by mules on a light track to the railroad spur. Formerly a dinky locomotive was used. The plant has a capacity of 100 tons per day, with six men employed. The product is not screened at the pit.

TALC (see Soapstone).

TUNGSTEN.

Wolframite occurs in the form of masses and large crystals in a quartz vein in andalusite schist, 12 miles north of Raymond. The deposit is undeveloped.

Bibl.: Bull. 67, p. 176.

VOLCANIC ASH.

Mineralite Manufacturing Company. G. D. Hutchinson, president, M. H. Heitzig, secretary; office and factory, 3480 Tulare avenue, Fresno. This material is an extremely fine, powdery, though somewhat compacted volcanic ash, the deposit being on the ranch of C. D. Armstrong, in Sec. 1, T. 11 S., R. 20 E., 2 miles northwest of Friant. It was first worked about 15 years ago in a small way and used for a polish. The present lessees incorporated in March, 1914, and have developed the deposit to a depth of 20 feet to 30 feet by open cut. They ship the material to their plant in Fresno where it is crushed, and bolted through a 125-mesh screen. The product is marketed in the form of a polishing powder, and as scouring and polishing soaps. At the pit two men are employed intermittently.

ZINC.

It is stated that zinc is found in some of the ores of the Minarets district. It is also found in the North Fork Mining District.

Bibl.: R. XI, p. 222.

MARIPOSA COUNTY.

By F. L. LOWELL, Field Assistant.

Field Work in July, 1914.

Mariposa County might be said to possess more distinctions than any other county in California from the fact that not only does the southern extremity of the famous ''Mother Lode'' of the State end in this county but also that the famous Yosemite Valley and Mariposa Grove of Big Trees are included in it.

The county is bounded on the north by Tuolumne County, on the southeast by Madera County, and on the west and southwest by Merced County. The greater portion of the county is drained by the Merced River and its branches with the exception of that portion extending from the Mariposa Grant to the south end of the county. While the county receives a fair amount of rainfall, yet water is not very abundant during the summer and the power used in the prosperous days of mining in the county was derived from the then abundant wood fuel. Wood as a fuel at the present time is too expensive for working the grade of ores that now prevail.

POWER.

Some mines along the Merced River develop hydroelectric power from the river for their own use and the Mariposa Grant also supplies a limited amount of power for lighting purposes and mill power from its plant on the Merced River at Bagby. Their lines run from the Merced River through the grant to the towns of Mt. Bullion and the county seat, Mariposa. The plant consists of a flume 400 feet long by 16 feet wide and 6 feet deep which carries water under a 34-foot head to three Pelton wheels which are 27, 30 and 40 inches in diameter, respectively. The plant is capable of developing 600 horsepower and the power is generated by two Westinghouse dynamos.

The Pacific Gas and Electric power line comes from Tuolumne County to the Peñon Blanco mine and thence through the town of Coulterville to the Potosi gold mine owned by the Merced Gold Mining Company.

A company formerly had a power plant at Exchequer on the Merced River, but their plant was washed out during the heavy freshet of the winter of 1913. The San Joaquin Power and Light Company, which generates power from Merced Falls in Merced County, owns a power line which extends as far as the Mt. Gaines mine in the Hornitos mining district. This company also uses the Exchequer line for transmitting power.

Mariposa Commercial and Mining Company's dam and hydroelectric plant on the Merced River at Bagby, Mariposa County, California.

GEOLOGY.

Mariposa County is about 65 miles long and 35 miles wide. The serpentine, amphibolite schists and metamorphic slate belt comes as far south as the Mariposa Grant and south of this estate the granites of the eastern portion of the county crowd over toward the west, thus ending the so-called ''Mother Lode.'' The ''Grant'' boundaries appear to be well chosen so far as including most of the Mother Lode vein south of the Merced River is concerned, for, outside of these boundaries, the veins are smaller.

In the southeastern section of the county there is a limestone belt with a northeast and southwest direction which extends for some distance through the county. This limestone belt carries copper in considerable quantities. The formation in the eastern part of the county which is taken up by the Yosemite National Park, is mostly of granite and heavily timbered. No mineral is reported and no prospecting is being done within the boundaries of the National Park.

Mariposa County had many producing mines at one time but many of the larger ones reached a zone of decreased values and ceased operations at this point. On the Mother Lode in other counties, this same lean zone has been encountered and, in some cases, it has been pierced and better values found below. This advanced prospecting has not been done to any extent in this county, and it remains to be proven whether the shoots go down. Some of the mines have very enviable reputations as producers from the surface down to the point of abandonment. The fuel question has been a drawback to the county of late years. There are ores that could be worked at a profit if cheap power could be had. Wood costs $2.50 to $4 per cord delivered.

ASBESTOS.

Some asbestos of the amphibole variety has been found east of the Mariposa Grant, the exact locality not being known. It is impure and not being worked.

BARYTES.

El Portal Mining Company, whose office is at 354 Pine street, San Francisco, owns considerable barytes (heavy spar) on the north bank of the Merced River, about one mile down river from El Portal. The plant consists of a bin at the railroad tracks, also a bin at the quarry, a surface tram down the hill and two ore cars. No one was working in the quarry at the time the plant was visited. A very good quality of barium sulphate is produced.*

El Portal Mining Company's barytes quarry on the Merced River one mile below El Portal, Mariposa County, California.

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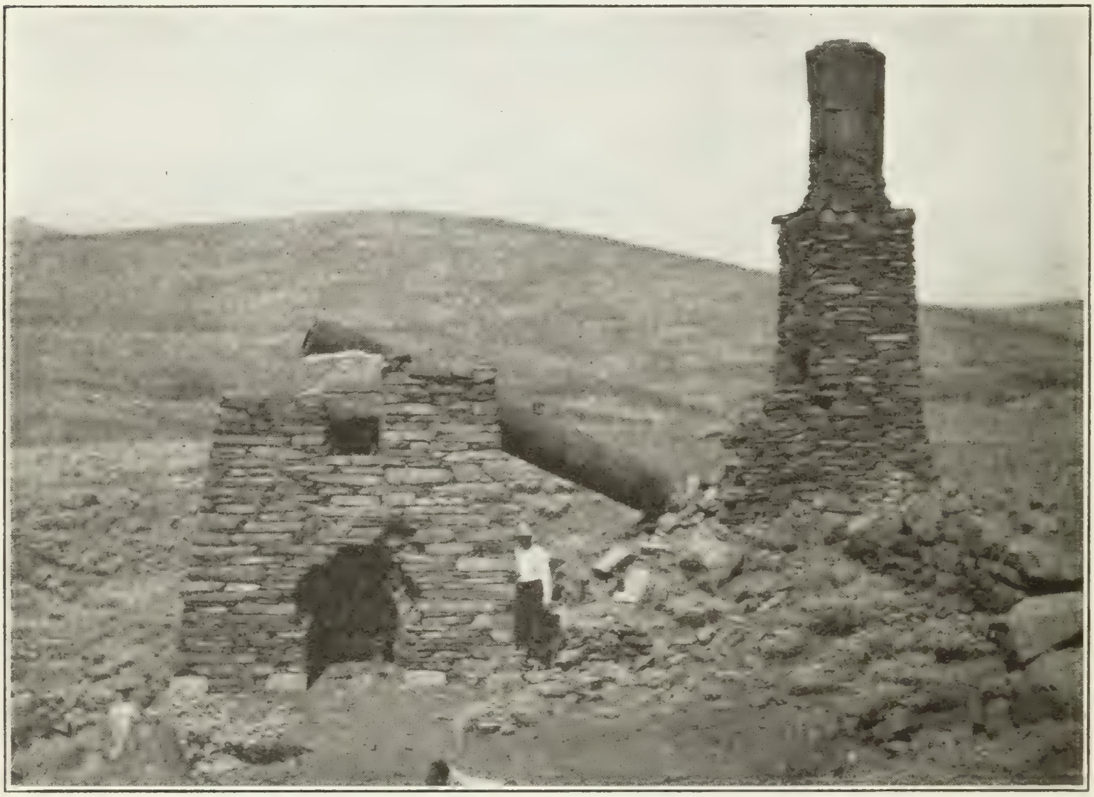
*The property is under lease to the Barbour Chemical Company, which has a plant at Melrose, Alameda County, Cal., manufacturing barium compounds.

COPPER.

Copper mining in the county has not reached large proportions and the southern end of the county is the only place where any work is being done and not much even there. Leasers are taking out most of the copper that is being shipped. This ore is freighted by wagon to the railroad at Raymond in Madera County and shipped to the smelters. This county is said to have had the first smelter in the State, the ruins of which are still standing not far from Green Mountain. The copper belt in this county extends for forty miles and considerable copper ore was mined in the early days, but the industry has dwindled to very insignificant proportions. Those properties that are operating at present will be described and a few of the new groups mentioned, but for the older and idle properties reference can be found in Bulletin No. 50, ''Copper Resources of California,'' issued by this Bureau in 1908.



Remains of what is said to have been the first smelter in California, near Green Mountain in southern Mariposa County, California.

Green Mountain Copper Group. This group, which consists of eight mineral claims and 26 acres of patented agricultural land, is situated in Sec. 3, T. 8 S., R. 18 E., M. D. M., about 8 miles by wagon road northwest of the railroad at Raymond in Madera County and owned by the Legioneer Gold Mining Company and J. B. Pearce. Two of the eight claims are patented, namely, the Copper Queen and Buena Vista. The Copper Chief, Buster Brown, Cuban Nigger, Flotsom, Jetsam, and Amador claims are not patented. The first claims were located in 1861 and have been worked and shut down at various times. The ores consist of copper oxides and carbonates. There are about 4,000 feet of underground works. A gossan capping covers the schist which carries the copper ores in the form of replacements. The mine is worked through tunnels. At present there is very little equipment on the ground with the exception of a horse whim, three ore cars and drill steel, also a dwelling house. Three leasers are working at present. Fifty-two cars shipped averaged $1,000 per car, but did not carry gold values. Assays showed 2 ounces in silver.

Pocahontas Copper Mine. This property, which consists of 320 acres of patented land, is situated in Sec. 14, T. 7 S., R. 17 E., M. D. M., about 16 miles northeast by wagon road from Le Grande in Merced County, which is on the Atchison, Topeka and Santa Fe Railroad. The property is owned by a stock company called the Pocahontas Mining Company, with their home office in San Francisco. The exact date of location is not known, but supposed to have been located in the early sixties. The mineral bearing formation is gossan, several seams of which run through the county, and the ores are principally sulphides and carbonates, the carbonates predominating down to about 100 feet when the sulphides take principal place. The greatest depth attained is by shaft, which is down 300 feet; 900 feet of drifting has been done, and a 200-foot tunnel has been driven on the vein. The mine equipment consists of a donkey engine, skip, tools, blacksmith shop, assay office, timber shed, and dwelling house. All the ore was shipped to the Selby Smelting and Lead Company by way of Le Grande. Two men are leasing the property now.

San José Copper Group. This group of copper claims, which was formerly known as the Cavan Copper Mine, consists of nine claims and one mill site all unpatented, and is situated in Secs. 5 and 8, T. 8 S., R. 18 E., M. D. M., about 10 miles northwest by wagon road from Raymond in Madera County. The property is owned by S. L. Pearce. These claims were located about fifty years ago and they consist of 170 acres. The lode is schist carrying replacement copper. The mine is worked by a 150-foot shaft. There are sixty-five feet of drifts, also a few prospect shafts and a crosscut tunnel. The only equipment consists of a horse whim, mine bucket and drill steel. The mine is being worked by Mr. Pearce, who has shipped seven carloads of ore to the Selby Smelting Works. They are said to have averaged $1000 per car. The ore carries $2.50 per ton in gold. The costs are $3.50 per ton for hauling to the town of Raymond and $2.25 per ton railway charges to the smelter. Total costs per ton are $12. A patent has been applied for, but not granted on account of litigation with homesteaders.

A group of 26 copper claims located in Sec. 30, T. 5 S., R. 19 E., just east of the Mariposa Grant near Mormon Bar in March, 1913, has been prospected in some places and bonds have been taken out on them, but so far no one has developed them. The ore carrying formation is quartz porphyry.

Another group of copper claims is located in Secs. 19 and 20, T. 6 S., R. 20 E., M. D. M., and is called the *Indian Peak Group.* There are fifteen claims in the group and most of the development work has been done on the Indian Peak claim. The copper ores which are in limestone with granite walls are mostly carbonates and sulphides. This limestone belt has a northeast and southwest direction and can be traced for some distance through the county. There are two incline shafts, each 35 feet deep and both are in ore. There are four tunnels, one 120 feet long, two 20 feet each, and another 50 feet long. The claims have a cabin and blacksmith shop on them. No work is being done at present. The Indian Peak claim was located twenty years ago and the other claims were located in 1913.

Copper dump on the property of the Indian Peak copper claims, Mariposa County, California.

Another group of copper claims in the Indian Peak district comprises seven claims and are owned by *Mrs. Emma Chard* of Red Bluff. These claims are not developed.

A second group of five claims in the same district is owned by J. L. Divens, Mrs. E. McKeith, Lee La Valley, and Matt Logan. There is a 20-foot tunnel on one of the claims and a shaft on another, but very little work has been done.

There is also a *copper vein* on the Mariposa Grant, in Sec. 18, T. 5 S., R. 18 E. The strike is northeast. The vein is in slate walls and has not been developed. It is about seven feet in width on the surface.

GOLD (LODE).

Gold mining in the county has suffered a relapse since the boom days notwithstanding the large production of some of the mines. The shutting down of the larger mines on the Mariposa estate and also those of the Merced Gold Mining Company in the Coulterville district, has, in a large measure, put a damper on mining, and the fact that cheaper power is not always available for working the lower grade ores also hampers the industry. While many of the older mines have reached a zone of unpayable values, yet there are numerous new properties that show promise of developing into mines if the necessary capital and energy are forthcoming. Many of these properties will be mentioned in the following list:

Adelaide Quartz Mine. Owned by the estate of Mary P. MacCrellish. W. P. Edwards of Alameda, manager. The claim is patented and located in Secs. 22 and 23, T. 3 S., R. 16 E., M. D. M., 1½ miles by wagon road from Kittridge. The vein, which has a northwest strike, is between serpentine footwall and slate hanging-wall, and ranges from 6 to 10 feet in width. About 2500 feet of development work, one tunnel and an old incline shaft 150 feet deep. The equipment consists of a 4-drill Sullivan air compressor, blacksmith shop, and boarding house. The mine was bonded, but the bond lapsed July 1, 1914, and is now idle.

Aden Quartz Mine. Owned by the Aden Mining Company, box 242, Vallejo. Very little information could be obtained on this property. There is a crosscut tunnel 300 feet long, 180 feet of drifts, and two shafts, one 105 feet and the other 40 feet in depth. Now idle.

Alice Quartz Mine. Owned by the Mariposa Commercial and Mining Company, Alaska Commercial Building, San Francisco. The property consists of two claims located in Sec. 16, T. 5 S., R. 17 E., M. D. M., 14 miles by wagon road to Merced Falls in a westerly direction. The vein of quartz lies between slate walls and averages 3 feet in thickness. The development consists of a 200-foot shaft, three levels with 360 feet of drifts, a winze 27 feet deep and a raise 38 feet long. There is no mine equipment on the property and it has not been worked since 1902.

Anderson Quartz Mine. Owned by the estate of Mary P. MacCrellish, W. P. Edwards of Alameda, manager. The property consists of one patented claim located in Sec. 23, T. 3 S., R. 16 E., M. D. M., about 1½ miles by trail north from Kittridge and 5 miles by wagon road to Coulterville. The quartz ledge has serpentine footwall and slate hanging-wall and measures from 4 to 12 feet in width. The development consists of a 30-foot incline shaft, 3 levels and a tunnel 120 feet on the vein. The equipment consists of shaft with rails, one skip, 25 h.p. motor hoist, one bailing skip and pump. There is also a blacksmith shop, engine house, bunkhouse, and boarding house. The mine has been under bond, but it expired July 1, 1914, and is now idle.

Artru Mine (pocket). Owned by H. Artru and consists of a fraction of a claim 450 feet in length and located in Sec. 27, T. 4 S., R. 18 E., M. D. M., 3½ miles by trail from Saxon Creek station on the Yosemite Valley Railroad and 20 miles by wagon road to Bagby. The ore body is a porphyry dike said to average 20 feet in width and having slate hanging-wall and footwall. The development consists of a 75-foot shaft, 450 feet of drifts, 4 crosscut tunnels each about 140 feet long and several small raises. There is a cabin on the claim and a wheelbarrow and drill steel. The gold obtained is of the crystallized variety. The mine has been shut down for two years.

Austin Quartz Mine. Owned by the Austin Group Mining and Milling Company, 244 Kearny street, San Francisco. Consists of four unpatented claims, located in Secs. 29 and 32, T. 4 S., R. 18 E., M. D. M., 25½ miles by wagon road to Bagby on the Yosemite Valley Railroad. The quartz vein is from 6 inches to 4 feet in width and lies between porphyry walls. The development consists of two incline shafts each 120 feet deep, one crosscut 700 feet long and a drift 150 feet long, also one stope 60 feet long by 120 feet high. The equipment consists of a hoist, blacksmith shop, 10-stamp mill, compressor, one Pindar concentrator, and Challenge feeders. The mine has not been working for the past one and one half years.

Bank of California Quartz Claim. Owned by G. E. Dunbar of 515 Southwest street, Kalamazoo, Mich. There are two unpatented claims, located in Sec. 27, T. 4 S., R. 18 E., M. D. M. The vein of quartz averaged 2½ feet in width and has porphyry and slate walls. The development consists of a 50-foot shaft, also a 75-foot shaft, which is now filled up. Is idle at present.

Black Log Quartz Claim. Owned by F. N. Clark and Wm. Bush of Mariposa. This is a prospect located in Sec. 13, T. 4 S., R. 18 E., M. D. M., and the only development work done consists of an incline shaft 70 feet deep. The vein is 8 inches to one foot in width. Only assessment work is done.

Blue Bell Quartz Mine. Owned by Hiram W. Branson and located in Sec. 9, T. 4 S., R. 20 E., M. D. M., 10 miles by trail from El Portal, near Jerseydale. The property consists of two unpatented claims and the vein of quartz lies between porphyry footwall and slate hanging-wall and has an average width of 5 feet. The development consists of a 145-foot crosscut tunnel and 80 feet of drifts. No equipment outside of an iron ore car, drill steel, and blacksmith shop. Mine not working.

Bogan & Baitaille Quartz Mine. Owned by Fred Mebold and consists of one patented claim located in Sec. 26, T. 4 S., R. 18 E., M. D. M., 20 miles by wagon road from Bagby. The quartz vein which averages about 2½ feet wide has a prophyry footwall and a slate hanging-wall. The development consists of four adit levels being 60, 100, 250, and 300 feet long, respectively, and several raises. The equipment consists of one ore car, mortar and spring pole, and a blacksmith shop. The mine is not working at present.

Bondurant Quartz Mine. Owned by A. L. Adams of 307 Center street, Bridgeport, Conn., and consists of 100 acres of patented claims, also 700 acres of patented timber land located in Secs. 25 and 36 in T. 2 S., R. 16 E., M. D. M., 13 miles north of Bagby by wagon road. The ledges are quartz and there are eight of them. They have slate walls and the Bondurant vein is 7 feet wide, the Reynolds 4 to 10 feet, and the Louisiana 4 to 15 feet. The development consists of a 412-foot incline shaft, 975 feet of drifts, 945-foot crosscut on river level, and 225-foot crosscut on adit level; also 150-foot air raise and 20-foot winze. The Reynolds shaft is down 125 feet. There are 5 stopes. The equipment includes a hoist, one Ingersoll-Sargent compressor, 40 h.p. boiler, 2 machine drills, skip, 2 blacksmith shops, drill steel, compressed air pipe, and one Worthington pump. The reduction equipment includes a 10-stamp mill (1000-pound stamps), rock crusher, Challenge feeders, two 4′ x 16′ plates, two Union tables, one Dean pump, mill engine, two small pumps and one 60 h.p. boiler. Five men were working doing development work. G. H. Gerkin, superintendent.

Booth Quartz Claim. One claim patented, owned by C. L. Booth of Mariposa, and located in Sec. 5, T. 5 S., R. 20 E., M. D. M. The strike is northwest and southeast and dips northeast about 45°. There are two shafts, 28 and 95 feet deep, and one tunnel 120 feet long. The vein varies from a few inches to 18 inches in width. No work is being done.

Bowman Quartz Claim. A pocket claim owned by F. N. Clark of Mariposa, located in Sec. 26, T. 4 S., R. 18 E., M. D. M. There are several prospect holes and shafts. Nothing being done at present.

Bull Dog Quartz Claim. Consists of one claim owned by Theodore Kokel of Lyons Gulch and situated in Sec. 31, T. 4 S., R. 18 E., M. D. M., 25 miles from Bagby on Yosemite Valley Railroad. The vein of quartz varies from 2 to 4 feet in width and lies between porphyry walls. Only assessment work is done each year and there is only a windlass on the property.

Bull Pup Quartz Claim. Consists of one claim owned by Jack Zerney of Merced, located in Sec. 31, T. 4 S., R. 18 E., M. D. M., 25 miles from Bagby by wagon road. The vein is 2 to 4 feet wide in porphyry walls and the development consists of an incline shaft 165 feet deep and 100 feet of drifts. There is practically no equipment with the exception of a windlass and a wooden skip. The claim has been relocated from year to year.

Bunker Hill Quartz Claim. Owned by Charlie Lewis of Hites Cove. The claim is located near Hites Cove and is said to have had the first quartz mill in the state in 1851. The claim is still unpatented and has had considerable development work done on it. The mine was discovered from quartz brought to the surface in a squirrel hole and was formerly called the Squirrel Mine. Still held by possessory rights.

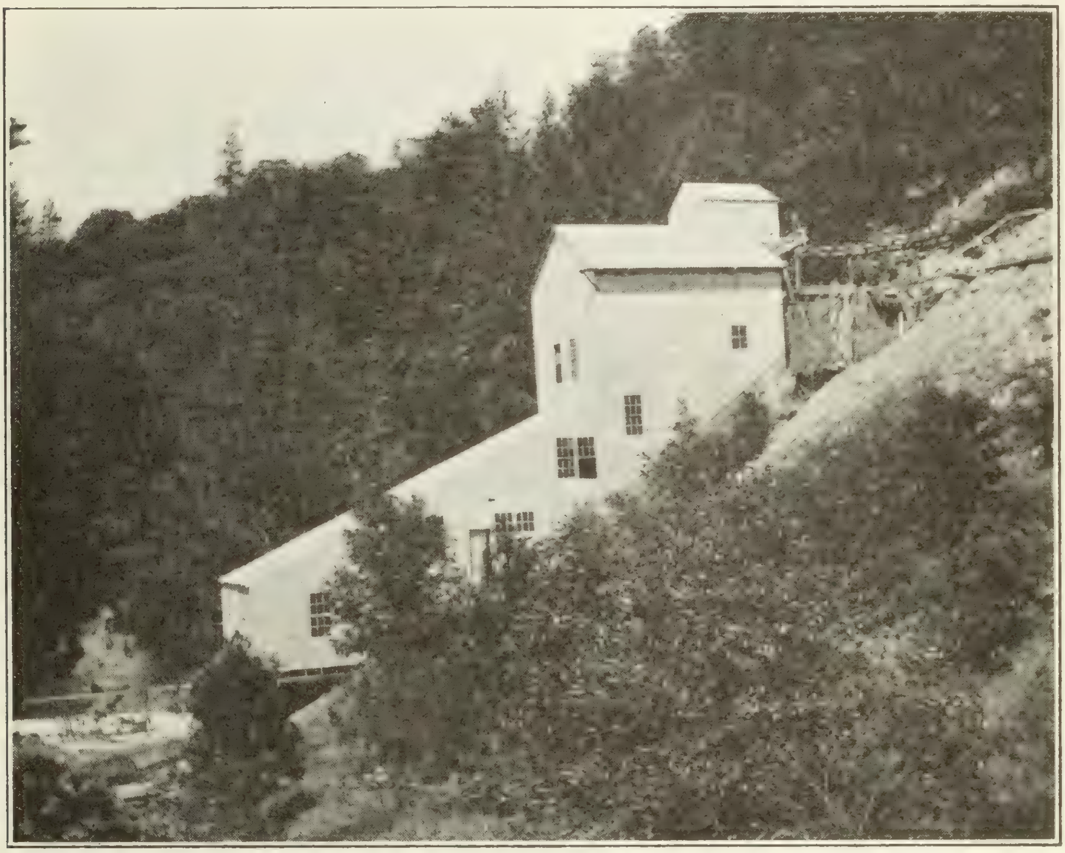
Busch Quartz Mine. Three unpatented claims owned by L. F. W. Busch of Mariposa, located in Sec. 21, T. 4 S., R. 18 E., M. D. M., 4½ miles south of Briceburg and 22 miles from Bagby by wagon road. The vein is 16 feet wide at the surface and 9 feet wide in the bottom of the shaft, and the walls are slate. The development consists of a 180-foot shaft, 140 feet of drifting, one winze, length unknown, and one crosscut 67 feet long. There is a blacksmith shop and hoisting shed, also windlass, in the way of equipment. Only assessment work is being done.

Busch Quartz Claim. One unpatented claim owned by L. F. W. Busch, situated in Sec. 28, T. 4 S., R. 18 E., M. D. M., east of the Diltz mine. The vein which is in porphyry walls is 2 feet wide and has a strike of northwest and southeast and dips northeast. Only assessment work is being done.

Champion Quartz Mine. Consists of one unpatented claim owned by G. E. Dunbar of Mariposa, and located in Sec. 27, T. 4 S., R. 18 E., M. D. M., 22½ miles by wagon road from Bagby. The quartz vein averages 4 feet wide and has porphyry footwall and slate hanging-wall. Development consists of a shaft 9 feet deep, 188 feet of drifts, 3 levels and an air shaft 60 feet to surface. No equipment remains on the property. Only assessment work is done.

Cohen Quartz Mine. Consists of one patented claim owned by a man by the name of Cohen and is situated in Sec. 33, T. 4 S., R. 18 E. The claim was patented in 1912, but has not been worked for some time. Very little information could be obtained about the mine.

Colorado Quartz Mine. Consists of three claims, one of which is patented, owned by P. W. Judkins, C. H. Weston and I. L. Dearborn of Mariposa and located in Sec. 27, T. 4 S., R. 18 E., M. D. M., 22 miles by wagon road from Bagby. The vein is a true fissure vein with slate walls and averages 2 feet in width. The development consists of an adit level 500 feet long, an air raise 119 feet long and a second raise 75 feet long, also a winze 14 feet deep. There is one stope 120 feet long and 35 feet high. The equipment consists of a gasoline hoisting engine, 4 ore cars, drill steel, 10-stamp mill, rock crusher, Challenge feeders, two 5′ x 10′ amalgamating plates, 2 tables, 2 vanners, and a blacksmith shop. There is also an assay office, change house, bunkhouse, office, storeroom, and dwelling house. There is a surface tramway from the mill to the wagon road above. This mine was being developed at the time it was visited.



Colorado Gold Quartz Mine on Long Gulch Creek, Whitlock mining district, Mariposa County, California.

Colorado Quartz Claim. Consists of two claims, one of which is patented, owned by P. W. Judkins, C. H. Weston and I. L. Dearborn of Mariposa and located in Sec. 32, T. 4 S., R. 18 E., M. D. M., 30 miles by wagon road from Bagby. Fissure vein in slate is 2 to 6 feet wide. The development consists of a 500-foot adit level, 140-foot raise to surface, another 65-foot raise and 13-foot winze. One stope 300 feet long. Equipment consists of 3 ore cars, tools and blacksmith shop. There are also a Gates rock crusher, 2 Gates tables, 2 vanners, assay office, bunkhouse, and superintendent's house. There are 5 gas engines all told for the plant. The mine is working most of the time.

Comet Gold Mine. Consists of three unpatented claims owned by the Comet Mining and Milling Company of Kansas City, Mo., and located in Sec. 22, T. 4 S., R. 19 E., M. D. M., 15 miles by wagon road from the town of Mariposa. The quartz vein averages 2½ feet wide and has a granite footwall and slate hanging-wall. The development consists of two adit levels in which 785 feet of drifts have been run, also 100 feet of crosscut, two raises, one 40 feet and one 168 feet and one winze 45 feet deep. The equipment consists of 3 iron ore cars, drill steel, ventilating pipe, 10-stamp mill, Blake rock crusher, Challenge feeders, 2 amalgamating plates, 4′ x 12′ Deister tables and clean-up frame. There is also a sawmill and 45 h.p. boiler for the same, and overshot water wheel for the ventilating fan. The steam is piped 300 feet in naked pipe to the stamp mill. The buildings include bunkhouse, office, residence, storehouse, assay office and cookhouse. The mine was not working at the time it was visited, but was being examined.

Compromise and Eubank Quartz Mine. Consists of 40 acres owned by J. A. Flink and R. C. Haywood and located in Secs. 30 and 31, T. 2 S., R. 18 E., M. D. M., 30 miles from the railway. The vein averages 2 feet in width between hard slate walls. The development consists of a shaft 350 feet deep, 100-foot winze, and three levels each 100 to 700 feet long. The property has been idle for thirty years and has recently been bought by the present owners from P. J. and W. W. Hilliard.

Cranberry Quartz Mine. Consists of one patented claim and a mill site owned by A. H. Ward of 53 Stevenson street, San Francisco, located in Sec. 15, T. 3 S., R. 19 E., M. D. M., on the Yosemite Valley Railroad. The vein is 3 to 6 feet wide, and is a fissure vein in slate walls. The development consists of 410 feet of shaft and winze, 1240 feet of drifts, winze 300 feet deep and a raise 460 feet long. There is no equipment on the property at present. It has not been worked for twenty years.

Crown Lead Gold Mine. Consists of one patented claim owned by the estate of Mary P. MacCrellish; W. P. Edwards, manager, of Alameda, and located in Secs. 26 and 36, T. 3 S., R. 16 E., M. D. M., on the Yosemite Valley Railroad. The vein is 10 feet and has a serpentine footwall and slate hanging-wall. The development consists of a 50-foot incline shaft and a 25-foot tunnel. There is no equipment on the property and the underground works have caved. The property was under bond, but it expired July 1, 1914.

Crown Peak Quartz Mine. Consists of one patented claim owned by the estate of Mary P. MacCrellish and located in Sec. 36, T. 3 S., R. 16 E., M. D. M., at Kittridge on the Yosemite Valley Railroad. There are two veins averaging 7 feet in width and having serpentine footwall and slate hanging-wall. The development consists of a 45-foot incline shaft and a 50-foot open cut. There is no equipment on the property. It was under bond but it expired July 1, 1914. The mine has not been worked for many years.

Diltz Quartz Mine. Consists of two claims, one of which is patented, owned by S. J. Harris and wife of Jerseydale, and located in Sec. 29, T. 4 S., R. 18 E., M. D. M., 3 miles by road and 5 miles by trail to Briceburg. The vein is 20 inches wide and has diorite footwall and slate hanging-wall. The development consists of a 30-foot drift and one adit level, also a 60-foot crosscut and winze 22 feet deep. The equipment consists of one small skip, one hand pump, 22 feet of 1½-inch water pipe, and a blacksmith shop. Some work has been done the past summer by the Mariposa Mines Development Company.

Early Quartz Mine. Consists of one unpatented claim owned by the August Revel estate and Eli Revel, and located in Sec. 27, T. 4 S., R. 19 E., M. D. M., 6 miles south of North Fork on the Yosemite Valley Railroad. The vein is from 3 to 6 feet wide in granite walls. The development consists of one adit level 800 feet long, one 40-foot crosscut tunnel and one stope 800 feet in length by 150 feet high. Equipment consists of a 10-stamp mill run by a 25 h.p. steam engine, one boiler, one amalgamating plate, 4 feet by 8 feet. The workings have caved and the mine is not working.

Elizabeth Quartz Mine. Consists of patented claims owned by the Mariposa Commercial and Mining Company, Alaska Commercial Building, San Francisco, and located in Sec. 5, T. 5 S., R. 17 E., M. D. M., on the Mariposa Grant, 16 miles by wagon road from Merced Falls. The vein averages 6 feet in width and has a slate footwall and diabase hanging-wall. The development consists of a 100-foot incline shaft and 100 feet of drifts, also one stope. The equipment consists of hoisting engine, one 40 h.p. boiler, ore car and blacksmith shop. This property has been worked by leasers only but has been closed since 1911.

Emma Quartz Mine. Consists of one unpatented claim owned by Marcus Shinskie, and located in Sec. 36, T. 3 S., R. 19 E., M. D. M., about five miles from the wagon road to Hites Cove. The vein swells and pinches and has a diorite footwall and slate hanging-wall. The development consists of a 90-foot tunnel and two other tunnels that have caved, also two 50-foot raises and a winze 4 feet deep. There are three stopes. There is practically no equipment on the property and it is now idle.

Farmers' Hope Quartz Mine. Consists of seven quartz claims (one patented), two placer claims, and a mill site owned by G. L. Kennedy of Mariposa, and situated in Sec. 29, T. 4 S., R. 18 E., M. D. M., 25 miles by wagon road from Bagby. There are three veins, one contact with mariposite footwall and porphyry hanging-wall. The development consists of two shafts and 1125 feet of drifting, one crosscut 385 feet long, 440 feet of raises and a 35-foot winze. The equipment consists of a gasoline hoist, one skip, 5-stamp mill, rock crusher, mill feed, one Frue vanner, one amalgamating plate 4′ x 10′, one 10 h.p. engine and one 12 h.p. boiler. The mine is not working at present and is for sale.

Feliciana Quartz Mine. Consists of one patented claim owned by J. B. Campbell of Mariposa and located in Secs. 12 and 13, T. 4 S., R. 18 E., M. D. M., 5 miles southeast of Briceburg by trail. The vein is from 2 feet to 6 feet in width and has slate walls. The development consists of a 700-foot tunnel, 600 feet of drifts, 400-foot crosscut, two winzes—one 40 feet and the other 55 feet deep. There is also a stope 700 feet long and 650 feet to the surface. The equipment is about all gone, only some grinding pans being left. The mine has not been worked for thirty years.

Geary Quartz mine. Consists of one claim, unpatented, owned by Mrs. Potter and located in Sec. 30, T. 4 S., R. 18 E., M. D. M., 25½ miles by wagon road from Bagby. The vein averages 3 feet wide and has a slate footwall and porphyry hanging-wall. The development consists of an incline shaft 100 feet deep and 325 feet of drifting. There is no equipment on the property and the mine is idle.

Gray Eagle Quartz Mine. Consists of two unpatented claims owned by B. C. Gruby of Coulterville and located in Sec. 30, T. 3 S., R. 17 E., M. D. M., 3 miles from Bagby by wagon road. The dike of porphyry consists of a 133-foot shaft, 355 feet of drifts, 300-foot crosscut tunnel and two stopes—one 60 feet by 40 feet and the other 60 feet by 35 feet high. The shaft has a double compartment and there is only one ore car and windlass on the ground. Mine is under bond and work is supposed to begin on August 1, 1914.

Golden Gate Group. Consists of three unpatented claims and a five-acre mill site owned by Chas. A. Schlaguerty of Mariposa and located in Secs. 18 and 19, T. 4 S., R. 17 E., M. D. M., 7 miles by wagon road from Bagby. The vein is from 3 to 6 feet in width and has a mariposite footwall and a slate hanging-wall. The development consists of a 210-foot shaft, an adit level 250 feet long, 250-foot crosscut and a 20-foot raise. There is only some drill steel and a small skip together with a blacksmith shop and a shed over the collar of the shaft. The mine is not working at present.

Greens Gulch Quartz Mine. Consists of one patented claim, owned by the Mariposa Commercial and Mining Company and located in Secs. 12 and 13, T. 5 S., R. 17 E., M. D. M., on the Mariposa Grant, 12 miles by wagon road from Bagby. The vein averages 3 feet in width and has slate walls. The development consists of a 300-foot shaft, 550-foot adit level, 870 feet of drifting, crosscut 200 feet long and about 250 feet of raises. There is one stope 200 feet long and 200 feet high. The equipment consists of a hoist, bucket, water skip, 2 machine drills, compressor, 2 pumps and an air receiver. The mine is under lease at present and power is supplied from the Princeton mine.

Guadaloupe Quartz Mine. Consists of one patented claim owned by the Mariposa Commercial and Mining Company and located on the Mariposa Grant in Sec. 32, T. 5 S., R. 18 E., M. D. M., 17 miles by wagon road from Bagby. The average width of the vein is 18 inches and the walls are granite. The development consists of a 250-foot tunnel, but could not find out what had been done in the way of drifting. The mine has no equipment and has not been worked by the company for years. Two leasers are now working the property.

Guest Quartz Mine. Consists of one claim on unpatented farm land and is owned by J. W. Guest, located in Sec. 35, T. 4 S., R. 16 E., M. D. M. The vein is 2 to 8 inches wide in slate walls. There is a shaft 50 feet deep and the equipment consists of a gas engine hoist, one ore car, skip and a pump. Only assessment work is done.

Herman Quartz Mine. Consists of two unpatented claims owned by George Herman of Mariposa and located in Sec. 29, T. 4 S., R. 18 E., M. D. M. The vein is said to average 10 feet in width and to have porphyry walls. The development consists of a tunnel, 210 feet of drifts, one shaft 30 feet deep and an air shaft 150 feet deep. Only a windlass and bucket comprise the equipment. Only assessment work is being done.

Hite Mine. Consists of one placer and 15 quartz claims owned at present by J. S. Spellman of 244 Kearny street, San Francisco, and located in Sec. 27, T. 3 S., R. 19 E., M. D. M. The veins average 4 feet in width and are in diorite hanging-walls and footwalls. The development consists of a shaft 330 feet deep and there are three levels and nine adit levels. The total drifting could not be obtained. There are some winzes and raises and a stope 800 feet long by 100 feet high. Most of the $2,000,000 taken from this mine has been extracted from near the surface. The equipment consists of an air hoist, several machine drills, air compressor, drill steel, skip, station pump, 10-stamp mill, 3 tables, Challenge feeders, 2 amalgamating plates and a cyanide plant. The mine has been closed down since 1882. There are several buildings; in fact, the mine is thoroughly equipped and also has a flume 500 feet long and takes water from the south fork of the Merced River. Idle at present and a caretaker on the property.

Hite Gold Mine on the south fork of the Merced River, Mariposa County, California.

Josephine Quartz Mine. Consists of one patented claim owned by the Mariposa Commercial and Mining Company and located on the Mariposa Grant in Sec. 16, T. 4 S., R. 17 E., M. D. M., 3 miles by wagon road to Bagby. The vein averages 6 feet in width and has slate walls. The development consists of a shaft 500 feet deep, 2518 feet of drifts, 710 feet of crosscuts, 400 feet of raises and a stope 500 feet long and 200 feet high.

The equipment consists of three mine cars, compressor, drills, drill steel, blacksmith shop, 30 h.p. motor; in fact, a complete mine equipment with buildings and hydroelectric power from their plant on the Merced River. Leasers are now working the mine. This mine is one of the largest belonging to this company.

Kane Quartz Claim. Consists of one unpatented claim, formerly called the Mayflower, owned by C. N. Kane of Mariposa and located in Sec. 2, T. 5 S., R. 19 E., M. D. M., between the Mt. Buckingham and the Golden Eagle. There are two tunnels, 60 and 140 feet long, respectively, and a 30-foot winze. There is no equipment. Only assessment work is being done.

Kennedy-Milburn-Allerd Quartz Claims. Consists of three unpatented claims owned by C. L. Kennedy, W. H. Milburn and Lawrence Allerd of Mariposa and located on the south fork of Chowchilla River, 2 miles east of Indian Peak, one half mile south of Nelson's Cove and 12 miles from Raymond in Madera County. The vein has a northeast and southwest strike and is about 9 feet wide. There is no wagon road to the claims and the development consists of a 40-foot adit level. Only assessment work is being done. Located in May, 1914.

Landrum Quartz Mine. Consists of two unpatented claims owned by Simeon Landrum and located in Secs. 34 and 35, T. 4 S., R. 18 E., M. D. M., 6 miles by trail from Briceburg. The vein averages 2 feet in width and has a limestone and talc footwall and a porphyry hanging-wall. The development work consists of a shaft 90 feet deep and 825 feet of drifts. The equipment consists of a gas engine, bucket and windlass. There are two cabins and a blacksmith shop. Only assessment work is being done.

Little Bear Quartz Mine. Consists of one unpatented claim owned by Pete Gordan of Mariposa and located in Sec. 19, T. 4 S., R. 19 E., M. D. M., 26 miles by wagon road from Bagby. The vein averages 2 feet wide and has a slate footwall and granite hanging-wall. The development consists of a 12-foot shaft. There is a cabin on the property, but nothing else. Only assessment work is being done.

Live Oak Quartz Mine. Consists of three unpatented claims owned by George Trede of Briceburg and located in Sec. 16, T. 4 S., R. 18 E., M. D. M., one half mile by trail from Saxon Creek station on the Yosemite Valley Railroad. The vein is about 20 inches wide and has a greenstone footwall and a slate hanging-wall. The development consists of 4 shafts, 20, 30, 40, and 80 feet deep, respectively, and a crosscut tunnel 200 feet long. The equipment consists of one half mile of ditch, 16-foot arrastra, 2-stamp mill, Pelton wheel, blacksmith shop, tools, boarding house, bunk house and gravity tramway. The mine is not working at present.

London Quartz Mine. Consists of one claim, unpatented, owned by Albert Austin and L. E. Austin of Whitlock and located in Sec. 30, T. 4 S., R. 18 E., M. D. M., 25½ miles by wagon road from Bagby. The vein has an average width of 22 inches and the walls are porphyry. The ore is base, carrying copper with the gold values. The development work consists of a 30-foot incline shaft and a 16-foot drift. Only a windlass and wheelbarrow comprise the equipment. The owners are working at present.

Long Mary Quartz Mine. Consists of patented land on the Mariposa Grant owned by the Mariposa Commercial and Mining Company and located in Sec. 17, T. 5 S., R. 17 E., M. D. M., 14 miles by wagon road from Merced Falls. The vein is 2 feet wide with slate walls. The development consists of a 413-foot shaft, 1480 feet of drifts, drain tunnel 263 feet long, and 905 feet of raises. There is one stope 350 feet long by 400 feet high. The equipment consists of a hoist, 50 h.p. boiler, headgear, blacksmith shop, 5-stamp mill, rock crusher, Challenge feeder, two Union tables and an amalgamating plate. Not working at present.

Louis Quartz Mine. Consists of one patented claim owned by the Mariposa Commercial and Mining Company and located in Sec. 11, T. 5 S., R. 17 E., M. D. M., 12 miles by wagon road from Bagby. The vein averages 4 feet in width and has slate walls. The development consists of a 400-foot shaft, 924 feet of drifts, adit level 350 feet long, 115-foot crosscut, 150 feet of raises and a 30-foot winze; also a stope 80 feet long. There is no equipment on the property at the present and the property is idle.

Louisa Quartz Mine. Consists of one unpatented claim owned by August Revel and Eli Revel of Sweetwater and located in Sec. 27, T. 4 S., R. 19 E., M. D. M., 6 miles by trail from South Fork station on the Yosemite Valley Railroad. The vein is 4 feet wide between granite walls. The development consists of a 16-foot shaft and some trenches on the surface. There are also two adit levels 50 and 60 feet long, respectively. There is no equipment and only assessment work is being done.

Louise Quartz Mine. Consists of claims owned by the Merced Mining Company of Boston, Mass., and located in Sec. 4, T. 3 S., R. 16 E., M. D. M., in the Coulterville mining district. There are three levels and a vertical shaft 375 feet deep, 850 feet of drifts, 775 feet of crosscuts, 150-foot air shaft, 600 feet of winze. This mine has been idle for a number of years and not much information could be found about it.

Lovely Rogers Quartz Mine. Consists of one patented claim and one unpatented claim owned by Shimer Brothers of Coulterville and located in Sec. 11, T. 3 S., R. 17 E., M. D. M., 16 miles by road from Bagby. The vein is 2 feet wide in slate walls. The development consists of a 100-foot shaft and 3 adit levels, 400, 300, and 250 feet long, respectively; also a 70-foot crosscut and a winze 80 feet deep. There is one stope 200 feet long and 80 feet high. There is no equipment. Only development work is being done.

Malivina Quartz Mine. Consists of one claim belonging to the Merced Gold Mining Company of Boston, Mass. The development consists of a vertical shaft 1000 feet deep, one incline shaft on the vein 875 feet deep, 2287 feet of drifts and 1225 feet of crosscuts. The milling is done on the adjoining Potosi mine owned by the same company. The equipment consists of a hoisting engine and building and head frame. The ore was trammed by mule team to the Potosi mill. Idle at present.

Malone Quartz Mine. Consists of five unpatented claims owned by the Golden Wreath Mining Company of San Francisco and located in Sec. 5, T. 5 S., R. 19 E., M. D. M., 28 miles by wagon road from Bagby. The vein ranges in width from 3 inches to 1 foot, between granite walls. The development consists of a 150-foot shaft, 600 feet of drifts, one adit level and a 600-foot crosscut tunnel. There is a stope 300 feet long, and 90 feet high. The equipment consists of a skip, 20 h.p. engine, 25 h.p. hoist engine, 80 h.p. boiler, 10-stamp mill, Golden State rock crusher, 2 Challenge feeders and 2 amalgamating plates. There is a dwelling house, blacksmith shop, boarding house, and bunkhouse. The mine had just started its plant at the time it was visited.

Mariposa Quartz Mine. Consists of one patented claim owned by the Mariposa Commercial and Mining Company of San Francisco and located in Sec. 23, T. 5 S., R. 18 E., M. D. M., 16 miles from Bagby by wagon road. The vein averages 5 feet in width and is in diabase walls. The development consists of a 1550-foot shaft, 5757 feet of drifts on the 8 levels, 800 feet of crosscuts, 1000 feet of raises and about 100 feet of winzes. All the ground is stoped from the eighth level to the surface with a width of 500 feet. The equipment consists of a reduction plant, namely, 5-stamp mill, Challenge feeder, 4′ x 12′ plate, compressor, hoist, one 75 h.p. and one 10 h.p. motor, blacksmith shop, machine shop, tools and machine drills. All underground equipment has been removed to the surface as the mine is caving. When the mine was visited a roasting furnace and cyanide plant was being completed to treat some concentrates lying on the mine. This plant is to be operated by leasers. The mine is idle and formerly used to be one of the large producers of the county.

Mary Harrison Quartz Mine. Consists of one claim owned by the Merced Gold Mining Company of Boston, Mass., and located in Secs. 10 and 11, T. 3 S., R. 16 E., M. D. M., 9 miles from Pleasant Valley by wagon road. The vein averages 2 feet in width and lies between slate walls. The development consists of a 1200-foot shaft; on the 12 levels there are 4800 feet of drifts, 700 feet of crosscuts, an incline shaft 600 feet deep, 540 feet of winzes and some raises that have been stoped out. There are many stopes of various dimensions. The equipment consists of a fine boiler house with boilers, engine house and hoisting engine, stone office building, storehouse and all kinds of machinery parts and hardware, also rock crusher and bins. The ore was crushed and hauled by tram over a narrow gauge track to the Potosi mill which is owned by the same company. This property, which was formerly one of the large producers of the county, has not been worked for some years. A caretaker remains on the property.

Mebold Quartz Mine. Consists of one unpatented claim owned by Fred Mebold of Jerseydale and located on Sweetwater Creek, northwest of the Sweetwater mine. It has a 50-foot crosscut tunnel and a few feet of drifts. The vein is 2 feet wide and in granite walls. Not working at present.

Merced River Quartz Mines. Consists of 13 unpatented claims owned by R. A. Keller and the James Burns Company and located in Secs. 15, 16 and 22, T. 3 S., R. 16 E., M. D. M., one half mile from the Yosemite Valley Railroad. The vein is from 1 to 4 feet in width. The development consists of a 100-foot shaft with two levels and 210 feet of drifts. Another shaft is 90 feet deep. There is one crosscut 230 feet long. The equipment consists of a 10-stamp mill which is not erected, 2 rock crushers, 25 h.p. gas engine, boarding house, bunk house, and dwelling house. Not working at present.

Mocking Bird Quartz Mine. Consists of one patented claim owned by J. A. Schroeder and C. J. Schroeder of Mariposa and located in Sec. 27, T. 4 S., R. 18 E., M. D. M., 20 miles by wagon road from Bagby. The vein averages 3 feet in width, with porphyry footwall and slate hanging-wall. The development consists of a 100-foot shaft and 100 feet of drifts. Blacksmith shop, drill steel, bucket, windlass and cabin complete the equipment. Only in a prospect condition and a little work is done each year.

Monte Cristo Group. Consists of four unpatented claims owned by F. M. Skilton and L. C. Worthington of Jerseydale and located in Sec. 20, T. 4 S., R. 20 E., M. D. M., 13 miles by wagon road and trail from the forks of Merced River and 3 miles by trail from the Comet mine. The quartz vein averages 6 feet wide, as far as opened up, and carries some arsenic and antimony with the values. There are: 65-foot incline shaft and several open cuts in the way of development, but there is no equipment outside of a cabin, blacksmith forge, windlass and bucket. This property was idle at the time it was visited but an examination had been made and the engineer took his report to New York to try to sell the property.

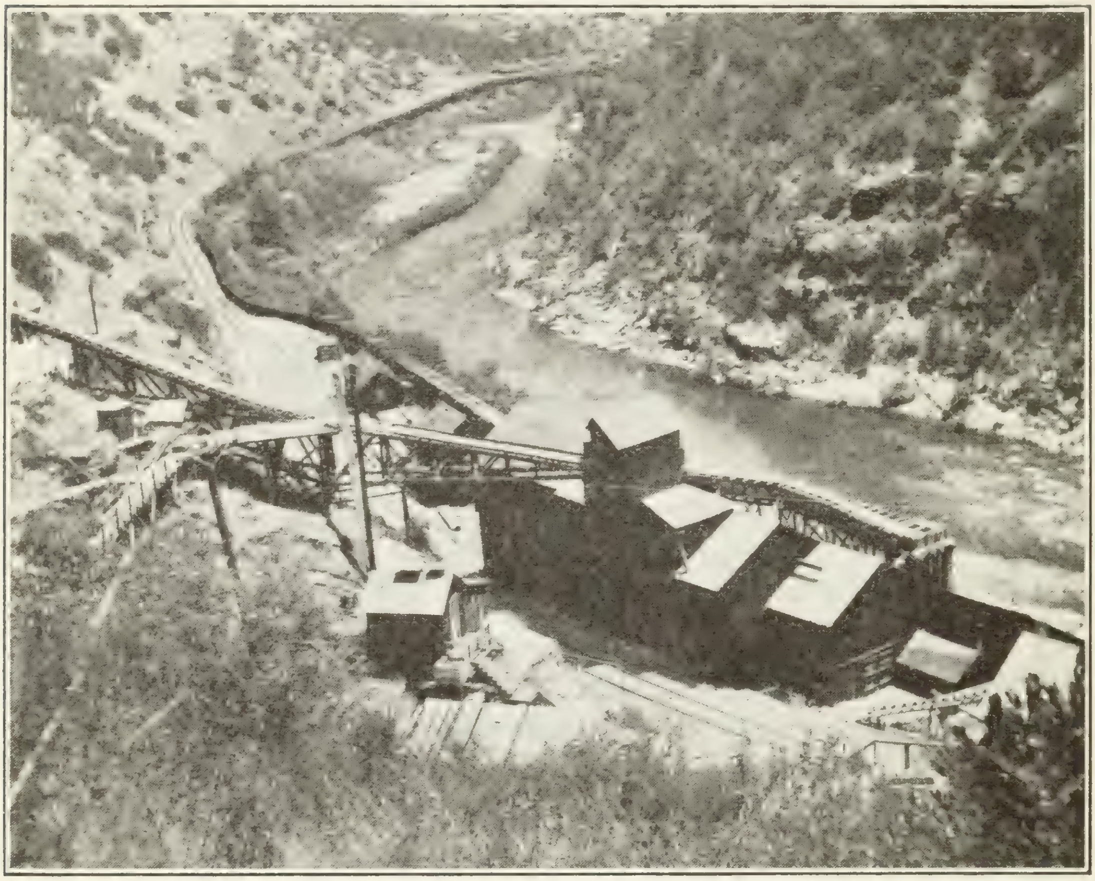
Mountain Belle Quartz Mine. Consists of one patented claim owned by J. P. Crichton of San Francisco and located in Sec. 25, T. 5 S., R. 17 E., M. D. M., 14 miles by wagon road from Bagby. The vein averages 3 feet wide in quartz porphyry walls. The development includes a 174-foot incline shaft and 100 feet of drifting on the two levels. The equipment consists of a 10 h.p. gasoline engine, an amalgamating plate 4′ x 10′, one Union concentrator, 15 h.p. gasoline engine for the mill drive and a Blake rock crusher. The buildings include a boarding house. Nothing has been done on the claim since 1908.

Mt. Buckingham Group. Consists of eight quartz claims, 2 mill sites and 169 acres of timber land. Twenty acres of the quartz claims are patented and the 169 acres of timber are also patented. These claims are owned by the Mt. Buckingham Gold Mining Company of Mariposa and are located in Secs. 1, 2, 11 and 12, T. 5 S., R. 19 E., M. D. M., 13 miles from Briceburg by wagon road. There are five contact veins with granite footwall and slate hanging-wall and the widths range from 2 feet to 10 feet. The development consists of a 500-foot crosscut tunnel, 250-foot raise and 30-foot winze. There are two stopes—one 40 feet long by 200 feet high and the other 60 feet long and 200 feet high. The equipment consists of three mine cars and hand drill steel. Not working but expect to begin soon. J. L. Diven in charge.

Mt. Gaines Quartz Mine. Consists of 14 claims owned by A. R. Maines, 439 Kingsley drive, Los Angeles, and located in Sec. 35, T. 4 S., R. 16 E., M. D. M., 14 miles by wagon road from Merced Falls. The vein pinches and swells into various widths and lies between diorite walls.

The development consists of an incline shaft 1350 feet long with 11 levels and 7840 feet of drifts and 250 feet of raises. There are two large stopes—one 340 feet long by 550 feet high and several smaller ones of irregular shapes. The equipment consists of a power line from the San Joaquin Power and Light Company's line to the property, hoisting equipment by air or steam, 2 boilers, one 10-machine compressor, 9 machine drills, pipe, skip, 5 pumps, including sinking pump, 20-stamp mill, rock crusher, Challenge feeders, 4 amalgamating plates and 8 concentrators. There are also blacksmith shop, store room, office, cook house, 2 bunk houses, assay office, 4 cabins, transformer house, sulphuret house, boiler house, compressor building, 4 cottages and superintendent's house. The mine closed down in 1910 and has not worked since.

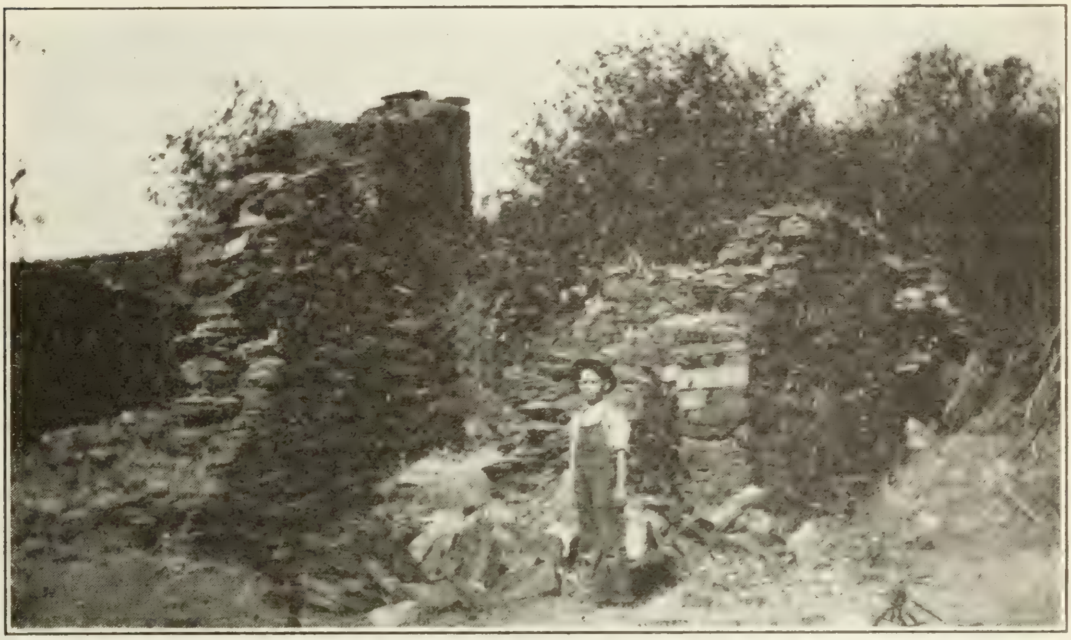
Mountain King Quartz Mine. Consists of 12 claims owned by the Mountain King Mining and Milling Company of 244 Kearny street, San Francisco, and located on the north bank of the Merced River on the Yosemite Valley Railroad in Sec. 31, T. 3 S., R. 18 E., M. D. M. The veins of quartz and slate average 5 feet in width and lie between slate walls. The development consists of 5 levels with 5200 feet of drifts, 1550 feet of crosscuts, 70 feet of winzes and 700 feet of raises. There is also a stope 200 feet long by 600 feet high.



Mountain King Mine, mill and ditch line on the Merced River, Mariposa County, California.

The equipment consists of 10 ore cars, 4 machine drills, drill steel, blacksmith shop, timber shed, 34-stamp mill, Blake crusher, 2 amalgamating plates, 2 Challenge feeders, 6 Standard tables, flume 1000 feet long, 2 Victor turbines, Rix compressor, Gould triplex pump, office, bunk house, cook house, change house, assay office, foreman's office, superintendent's office and residence, and surface tramway. Ten stamps were working and 26 men were employed and 75 horsepower was being developed on the river in their power plant.

Mt. Ophir Quartz Mine. Consists of one patented claim located on the Mariposa Grant in Sec. 12, T. 5 S., R. 18 E., M. D. M., and owned by the Mariposa Commercial and Mining Company. It is 10 miles by wagon road from Bagby. The vein averages 5 feet in width and lies between a serpentine footwall and a slate hanging-wall. The development consists of three adit levels with 1500 feet of drifts, 360 feet of raises, 80 feet of crosscuts and 20 feet of winze. There is a stope 200 feet long and 300 feet high. There is not very much equipment on the property other than the track and ore car. The high voltage power line from Bagby passes over the property. It was closed down in 1910 and some leasing has been done but is idle now.



Ruins of what is said to have been the first mint in California, at Mount Ophir, on the Mariposa Estate. Fifty-dollar slugs were minted here.

Mt. Queen Quartz Claims. Consists of two unpatented claims owned by Daniel E. Johnson of Mariposa and located in Sec. 29, T. 4 S., R. 18 E., M. D. M., in the Whitlock mining district. The vein averages 2 feet in width. There are five shafts, three of them being 85 feet, 60 feet, and 45 feet in depth. There is a cabin and a windlass on the claims. The claims are under bond to the Mariposa Mines and Development Company.

Mountain View Quartz Mine. Consists of one patented claim owned by the Mariposa Commercial and Mining Company and located on the Mariposa Grant in Sec. 11, T. 5 S., R. 17 E., M. D. M., 10 miles by wagon road from Bagby. The vein averages 2½ feet in width and lies between slate walls. The development consists of two adit levels with 500 feet of drifting, 400 feet of crosscuts, 160 feet of raises and one stope, 50 feet long and 100 feet high. No equipment except the track. The ore was hauled to the Princeton mill by wagon. The mine has been closed for about a year. Was worked by leasers.

Number One Quartz Mine. Consists of one full claim owned by the Treasure Gold Mining Company of Hornitos and located in Secs. 34

and 35, T. 4 S., R. 16 E., M. D. M., 15 miles by wagon road from Merced Falls. The vein averages 3 feet in width with a slate footwall and diabase and porphyry hanging-wall. The development consists of a 360-foot shaft, three levels with 1150 feet of drifts, 130-foot crosscut and three stopes. The equipment consists of an electric hoist, 20-h.p. motor, skip, 2000 feet of rails, blacksmith shop, 10-stamp mill, 2 compressors, 2 motors, Challenge feeders, 2 amalgamating plates, 3 concentrators and a Johnson rock crusher. The buildings include a hoist building, assay office, store house, office and several small buildings. Power from the San Joaquin Power and Light Company. The mine has just been reopened.

Number Five Quartz Mine. Consists of two full claims and a half, unpatented, and owned by the Nevada Mineral Extraction Company of Berkeley, Cal., and located in Sec. 10, T. 5 S., R. 16 E., M. D. M., 13 miles by wagon road from Merced Falls. The vein of quartz varies from 17 to 30 feet in width and has a diorite footwall and a slate schist hanging-wall. The development consists of a 260-foot shaft, 110 feet of drifts, and a 427-foot crosscut. The equipment consists of an electric hoist, Gardner compressor, 35 h.p. motor for compressor, 40 h.p. motor for hoist, 2 machine drills, 100 feet of mine rails, bucket, blacksmith shop, Cameron sinking pump, duplex Fairbanks pump, Parker Linn ball crusher and Parker Linn ball pulverizer, Parker amalgamating machine and 3 motors for crushers and grinders. The amalgamating plates are treated by chemicals before mercury is used on them. Mine was being equipped at time it was visited. The buildings include assay office, transformer house, and small buildings.

Ore bins, crushing plant and amalgamating plant of the Number 5 Gold Mine, Hornitos mining district, Mariposa County, California.

Old Wilcox Quartz Claim. Consists of one unpatented claim owned by A. H. Ward of San Francisco and located in Sec. 18, T. 3 S., R. 19 E., M. D. M., on the north bank of the Merced River. The vein lies between a granite footwall and slate hanging-wall. The development consists of a shaft that is supposed to be 110 feet deep and a tunnel 75 to 80 feet long. The claim has not been worked since 1862 and has no equipment.

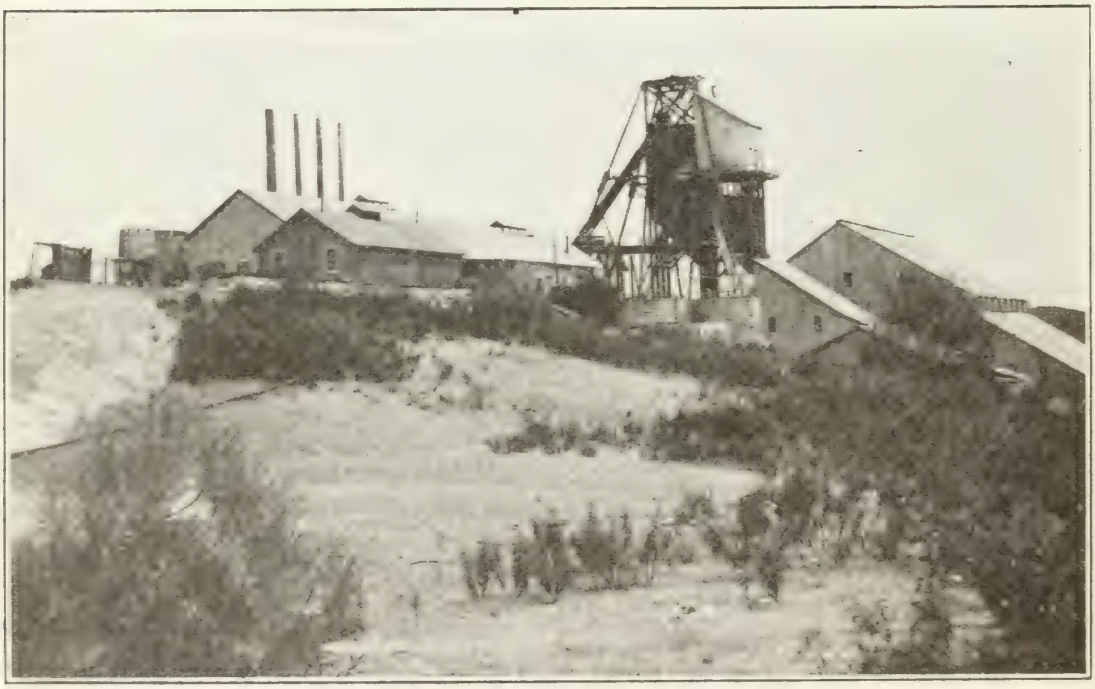
Original Quartz Mine. Consists of four unpatented claims owned by the Original Mining and Milling Company of Merced, Merced County, and located in Sec. 21, T. 3 S., R. 19 E., M. D. M. The vein averages 2 feet in width between slate walls. The development consists of a 640-foot shaft, 4 levels with 2053 feet of drifts, 185-foot crosscut, 485 feet of raises, a winze 462 feet deep and three stopes. The equipment consists of a hydroelectric plant on the Merced River which has a Westinghouse 133 k.w. generator, 100 h.p. Ingersoll Rand air compressor, one 30-inch and one 20-inch Pelton wheel, undershot and low pressure. The ditch and flume are 3400 feet long and carry 6000 inches of water at 34-foot head. An electric hoist (30 h.p.), one skip, 3000 feet of 12-pound mine rails, 1500 feet of 8-inch ventilating pipe, 2-inch compressed air pipe, 10 machine drills, drill steel, etc., are also included in the plant.

The reduction equipment includes a 10-stamp mill, Blake rock crusher, 2 Challenge feeders, two 4′ x 6′ plates and three Gates vanners. The buildings include an office, 2 bunk houses, dining room, change room, assay office, blacksmith shop, concentrate house, 8 small residences, and 7 small tent houses. The mine and mill are lighted by electricity. About 40 men are employed at present.

Orra Rica Quartz Mine. Formerly called the Peñon Blanco, consisting of five patented claims owned by J. C. Wilson and associates of San Francisco and located in Sec. 20, T. 2 S., R. 16 E., M. D. M., about 7 miles by wagon road from the town of Coulterville. The vein is from 3 to 6 feet in width and has a slate footwall and diorite hanging-wall. The development consists of a tunnel 2050 feet long and some drifts. Very little information was to be had as the mine is in litigation and all information was withheld.

Pine Tree Quartz Mine. Consists of one patented claim located on the Mariposa Grant in Sec. 9, T. 4 S., R. 17 E., M. D. M., 3 miles by wagon road from Bagby and owned by the Mariposa Commercial and Mining Company. The vein averages 10 feet in width and has a slate footwall and serpentine hanging-wall. The development consists of a 380-foot shaft with 4 levels and 400 feet of drifts, 133 feet of crosscuts, 700 feet of raises; the pay shoot is stoped for a length of 500 feet and to a height of 500 feet. The equipment consists of a 5-stamp mill called the Benton mill located on the Merced River at Bagby, 2 Union tables and two 20 h.p. motors. The ore is mined and hauled by wagon to Bagby. The mill has a Dodge crusher, Challenge feeder, amalgamating plate 5′ x 20′. The mine is now being worked by leasers.

Potosi Quartz Mine. Consists of one patented claim owned by the Merced Gold Mining Company of Boston, Mass., and located in Sec. 4, T. 3 S., R. 16 E., M. D. M., 9 miles by wagon road from Pleasant Valley on the Yosemite Valley Railroad. The vein is from 3 to 20 feet wide and has slate walls. The development consists of a shaft and 9 levels, 2500 feet of drifts, 2 air shafts, 50 feet of crosscut, 25-foot raise and a stope 100 feet long. The equipment is quite extensive and includes a power line of the Pacific Gas and Electric Company from the Orra Rica quartz mine, 11,433 feet long and a large motor not set up. There are also 3000 feet of track, shaft pump, ore cars and 2 rock crushers, 40-stamp mill, 16 Union Iron Works vanners, eight 4′ x 16′ amalgamating plates, Challenge feeders, blacksmith and machine shop with complete set of lathes and tools, boiler house and 4 boilers, compressors, hoisting engine, mill engine and engine for rock crusher. There are about 4 miles of narrow gauge track from the Mary Harrison mine to the Potosi mill, one 8-ton locomotive, twelve 3-ton ore cars, transformer house, change house, cook house, office, assay office, and several small buildings. The shaft was unwatered as far as the ninth level in 1912, when work ceased and the mine has been idle since.



Princeton Quartz Mine plant, belonging to the Mariposa Commercial and Mining Company of Mariposa County, California.

Princeton Quartz Mine. Consists of one patented claim owned by the Mariposa Commercial and Mining Company of San Francisco, and located on the Mariposa Grant in Sec. 18, T. 5 S., R. 18 E., M. D. M., 12 miles by wagon road from Bagby. The vein averages 8 feet wide and has slate walls. The development consists of an incline shaft 1660 feet long with 8 levels, 11,418 feet of drifts, 1827 feet of raises and 1300 feet of crosscuts. The shoot is stoped from the 1200-foot level to the surface. All underground equipment has been removed from below. There is a 40-stamp mill, Challenge feeders, amalgamating plates, Union tables, machine shop, blacksmith shop, carpenter shop, assay office, store, saw mill, change house, five 50 h.p. boilers, machine drills and tools, powder magazine and transformer house, two 150 h.p. and one 100 h.p. compressors, three motors, Snow duplex pump, and a Cameron sinking pump. The mine is fully equipped but idle at present.

Quail Quartz Claims. Consist of four unpatented claims located in Sec. 16, T. 3 S., R. 17 E., M. D. M., in the California mining district, 9 miles by wagon road from Bagby. The vein averages 4 feet wide and has slate walls. The development consists of a shaft, one adit level, 600 feet of drifts, 3 raises and a stope 200 feet long by 70 feet high. The equipment consists of 900 feet of rails, 3 ore cars, Park and Lacey duplex compressor, hoist and blacksmith shop. There are also 10-stamp mill, 2 rock crushers, 40 h.p. engine and 50 h.p. Nagle boiler. Not working at present.

Recorder Quartz Mine. Consists of one unpatented quartz claim owned by Frank Armstrong and Isaac Miller of Briceburg and located in Sec. 28, T. 4 S., R. 18 E., M. D. M., 22 miles by wagon road from Bagby. The vein averages one foot in width and lies between porphyry walls. The development consists of one adit level with 200 feet of drifting. There is a cabin on the mine. Only assessment work is done.

Reed Quartz Claim. Consists of a quartz ledge located on 154 acres of patented farm land in Secs. 28 and 33, T. 2 S., R. 16 E., M. D. M., and owned by Mrs. J. W. Reed. Only small prospect holes have been sunk.

Revel Quartz Mine. Consists of one unpatented claim owned by August Revel and Eli Revel of Sweetwater and located in Sec. 28, T. 4 S., R. 19 E., M. D. M., 6 miles by trail from North Fork station on the Yosemite Valley Railroad.

The vein averages 2 feet in width and lies between granite walls. The development consists of a 150-foot shaft, one level with 700 feet of drifts, 30-foot crosscut and a stope 800 feet long and 150 feet high. There is one ore car and some track on the property. The property is not working at present. The drifts have caved.

Roma Quartz Mine. Owned by the Harris Estate and situated in Sec. 14, T. 4 S., R. 18 E., M. D. M. The vein is 2 feet wide and there is a 1000-foot tunnel. It closed down 25 years ago and very little information could be found about it.

Royal Group. Consists of six unpatented claims and a fraction owned by Tresidder, Bains and Tresidder of Mariposa and located in Sec. 29, T. 4 S., R. 18 E., M. D. M. There are a shaft 75 feet deep, 200 feet of drifts and a 30-foot winze. The vein ranges from an inch to 18 inches in width and lies in porphyrite formation. Only assessment work is done.

Rutherford Quartz Mine. Consists of one patented claim owned by A. H. Ward of San Francisco and located in Sec. 22, T. 3 S., R. 19 E., M. D. M. The vein is 4 feet wide and the development consists of a 460-foot adit level and an 80-foot raise, also a stope 60 feet long by 80 feet high. There is no equipment on the property and no work has been done for 20 years.

Ruth Pierce Quartz Mine. Consists of two claims on patented agricultural land owned by the Hornitos Gold Mining Company of 127 Montgomery street, San Francisco, and situated in Sec. 13, T. 5 S., R. 16 E., M. D. M., 4 miles by wagon road from Hornitos. The vein averages about 3 feet in width and the development consists of a 550-foot shaft, part vertical and part incline, with 6 levels and 2272 feet of drifts. There is one stope 330 feet long by 375 feet high. The equipment consists of a 15 h.p. gasoline hoist, skip, mine track, boiler, 4-machine compressor, 4 machine drills, blacksmith shop, 10-stamp mill, Challenge feeders, two amalgamating plates 5 feet wide by 16 feet long, and two Frue vanners. The mine was taken over by the present company in May, 1913, and is now being put in shape to develop.

San Domingo Quartz Mine. Consists of one unpatented claim owned by Wm. Zeller of Escalon, near Stockton, and located in Sec. 13, T. 4 S., R. 18 E., M. D. M., 29 miles by wagon road from Bagby. The vein is 2 feet wide and has a slate footwall and a granite hanging-wall. The equipment consists of a 400-foot tunnel, 180-foot air shaft, several winzes and some raises. There are 180 feet of mine rails, one ore car, drill steel and a blacksmith shop. Only assessment work is being done.

Schroeder Group. Consists of 4 quartz claims and one placer claim owned by J. A. Schroeder, P. W. Judkins and C. H. Weston and located in Sec. 16, T. 4 S., R. 18 E., M. D. M., 2 miles by trail from Saxon Creek station on the Yosemite Valley Railroad. The vein varies from a few inches to 3 feet in width, and has porphyry footwall and slate hanging-wall. The development consists of an open cut 200 feet long and 30 feet deep and 375 feet of drifts. The equipment consists of

300 feet of track, 4 ore cars, blacksmith shop, and derrick. This is only a prospect and some work is now being done.

Sierra Rica Quartz Mine. Consists of two claims, one of which is patented, owned by M. A. Wilson and J. M. Graham of San Jose, located in Sec. 14, T. 4 S., R. 18 E., M. D. M,, 24 miles by road from Bagby. The vein averages 1½ feet in width and has porphyry footwall and slate hanging-wall. The development consists of a 300-foot tunnel on one claim and a 100-foot tunnel on the other, one 125-foot raise and one 60-foot raise. The equipment consists of 2 mine cars, tools, drill steel and a blacksmith shop. There are 4-stamp mill, Challenge feeders, rock crusher and one amalgamating plate 4 feet by 8 feet. There are two miles of ditch, one boiler and engine, a boarding house and two dwellings. Not worked at present.

Silver Lead Quartz Mine. Consists of three patented claims owned by the Mariposa Mining and Milling Company of Carson, City, Nev., and located in Sec. 34, T. 4 S., R. 16 E., M. D. M., 12 miles by wagon road from Merced Falls. The development consists of a 240-foot shaft and 422 feet of drifts. The equipment consists of an air hoist, compressor, 75 h.p. motor, sinking pump, gas engine, 5-stamp mill, rock crusher, Challenge feeder, one 4′ x 16′ amalgamating plate, 2 concentrators and two small motors—one 10 h.p. and the other 20 h.p. There is a boarding house, blacksmith shop, and a barn on the mine. Twelve men were being employed at the time the mine was visited.

Spencer Quartz Mine. Consists of a patented fraction of a claim owned by Ada Harris and located in Sec. 29, T. 4 S., R. 18 E., M. D. M., 23 miles by wagon road from Bagby. The vein averages 5 feet in width and has a diorite footwall and slate hanging-wall. The development consists of a 150-foot shaft, air shaft 150 feet long, 500 feet of drifts, 220 feet of crosscut, 50-foot winze, and a stope 350 feet long and 150 feet high. The equipment consists of one ore car, hand pump, drill steel and blacksmith shop. The mine is under bond to the Mariposa Mining and Development Company for six months.

Spread Eagle Quartz Mine. Consists of two unpatented claims owned by Nick Mullins of Whitlock and located in Sec. 32, T. 4 S., R. 18 E., M. D. M., 19 miles by wagon road from Bagby. The vein averages 2 feet in width and has porphyry walls. The development consists of a 210-foot shaft with 2 levels and 1800 feet of drifts. Adit level is 1000 feet long. There are one 200-foot crosscut, some winzes and raises, also some old stopes. The equipment consists of 2000 feet of mine rails, 2 ore cars, hand drills and 2 blacksmith shops. The mine is being leased.

Squirrel Mine (see *Bunker Hill*).

Stockton Creek Quartz Mine. Consists of one patented claim owned by the Mariposa Commercial and Mining Company and located in Sec. 24, T. 5 S., R. 18 E., M. D. M. The vein is about 2½ feet wide with diabase walls. The development consists of a 135-foot incline shaft with 2 levels and 550 feet of drifts and a stope 100 feet long by 70 feet high. The equipment includes a hoist, 5 h.p. dynamo, 200 feet of mine rails and a blacksmith shop. Not working at present.

Stud Horse Flat Group. Consists of three unpatented claims and a millsite owned by John P. Carroll of Bagby and located in Sec. 35, T. 3 S., R. 16 E., M. D. M., 3 miles from Bagby by trail. The vein is from 3 to 6 feet wide and has a slate footwall and porphyry and diorite hanging-wall. The development consists of a 150-foot shaft with 2 levels and 300 feet of drifts, 70 feet of old shafts and 80 feet of tunnels and a stope 250 feet long and 60 feet high. The equipment consists of a 5-stamp mill which has not yet been set up. Three men are employed sinking.

Sunshine Group. Consists of five quartz claims and one placer claim owned by Mrs. J. L. Divens, 147 Kempton avenue, Oakland, and located in Secs. 19 and 20, T. 4 S., R. 18 E., M. D. M. The veins vary from 1 foot to 3 feet in width and have poryhyry footwall and slate hanging-wall. The development consists of a 100-foot incline shaft, 280 feet of drifts, a 100-foot raise and a stope 140 feet long which is stoped to the surface. The equipment consists of 380 feet of mine rails, two skips, one mine car, drill steel and tools, gasoline hoist, 200-ton ore bin, and one Chilian mill. The power is from steam supplied from an adjoining mine. The mine is under bond to the Mariposa Mines and Development Company and not working at present.

Sweetwater Quartz Mine. Consists of seven quartz claims owned by the Midway Mining and Milling Company and located in Secs. 17 and 20, T. 4 S., R. 19 E., M. D. M., 38 miles by wagon road to Bagby. The vein averages 2½ feet wide and has granite walls. The development consists of a 100-foot shaft, 1500 feet of drifts, 240 feet of raises, one 6-foot winze, 600-foot crosscut tunnel and four stopes of various sizes. The equipment consists of 2300 feet of mine track, 2 iron skips, Cameron pump, 1 Blake rock crusher, Cornish rolls, 10-stamp mill, 2 amalgamating plates 4′ x 16′, two Johnson vanners, 1 Standard table, 1 Pindar table, 1 compressor, 2 boilers, 4 machine drills, boarding house, blacksmith shop, concentrate house and bunkhouse. The mine is bonded to J. L. McAllister and Mrs. E. McKeith and no work is being done at present.

Tyro Quartz Mine. Consists of one patented claim, the owner of which is unknown, and located in Secs. 9 and 10, T. 3 S., R. 16 E.,

M. D. M. The vein is 2 feet wide and has slate walls. The development consists of a 700-foot shaft, with 6 levels and 1370 feet of drifts, a 60-foot raise and a stope 80 feet long by 700 feet high. The equipment includes 1 skip, Cornish pump, Cameron steam pump, 10-stamp mill, rock crusher, 2 Challenge feeders, 2 amalgamating plates, 4′ x 12′, 3 Frue vanners, 2 boilers, 8 h.p. each, steam hoisting engine for mill, blacksmith shop, caretaker's house and a large oil tank and water tank. The mine is idle at present.

Virginia Quartz Mine. Consists of four claims, one of which is patented, owned by the White Gulch Mining Company of 263 Twelfth street, Oakland, and located in Secs. 13 and 18, T. 3 S., R. 16 E., M. D. M., 8 miles by wagon road from Bagby. The vein varies from a seam to many feet and has a serpentine footwall and diabase hanging-wall. The development consists of a 650-foot shaft with four levels and 250 feet of drifts, several crosscuts, about 350 feet of raises and 250 feet of winzes. There are two stopes—one 100 feet long by 150 feet high, and the other 100 feet long and 60 feet high. The equipment includes about 2000 feet of mine track, 2 ore cars, 700 feet of 3-inch compressed air pipe, 300 feet of 2-inch compressed air pipe, a Fairbanks-Morse hoist and 35 h.p. motor, 20 cubic foot skip, 200 feet of 2-inch pump column, 10-stamp mill, 2 Challenge feeders, Blake rock crusher, 2 amalgamating plates and a 50 h.p. gas engine. There are also 50 h.p. Ingersoll-Rand compressor, 3 miles of power line, blacksmith shop, bunkhouse, timber shed, cookhouse, office, transformer house, and superintendent's house. The mine has been operated by this company since 1912 and employs 15 men. C. C. Powning, superintendent.

White Oak Quartz Claim. Consists of one unpatented claim owned by A. H. Ward of San Francisco, and located in Sec. 18, T. 3 S., R. 19 E., M. D. M. The vein is 2 feet wide and has a granite footwall and slate hanging-wall. The development consists of a shallow prospect shaft, one tunnel 450 feet long in granite. Has not been worked for twenty years.

Whitlock Group. Consists of three patented claims owned by Dr. Gallison and Lizzie Sain and located in Sec. 32, T. 4 S., R. 18 E., M. D. M., 18 miles by wagon road from Bagby. The vein is 4 feet wide between greenstone walls. The development consists of a shaft and four levels and 2115 feet of drifts, winze 140 feet deep and 400 feet of crosscuts. The Alabama claim has a shaft 300 feet deep. There are two stopes—one 150 feet long by 150 feet high, and the other 240 feet long and 300 feet high. The equipment includes 2000 feet of mine rails, 6 ore cars, 3 trucks, 3 air machines and steel, 20-stamp mill, rock crusher, Challenge feeders, air compressor, 50 h.p. hoist engine, 3 boilers, 4 amalgamating plates, 4 vanners, assay office, blacksmith shop, boarding house and superintendent's house. The mine was shut down in 1899 and leasers worked it for a time, but it is idle now.

GOLD (PLACER).

Placer mining in the county has dwindled to almost nothing and what little work is being done is very irregular and depends very extensively on the rainfall. One does not see the long ditch lines in this county such as are to be found in other counties, bringing water to the placer mines.

Ah Wai Drift Mine. Consists of one unpatented claim (placer) owned by John Hand and W. D. Weston of Mariposa and located in Sec. 32, T. 4 S., R. 18 E., M. D. M., 25 miles by wagon road from Bagby. The gravel is bench gravel with a rough slate bedrock with free wash and large boulders.

The development consists of 2000 feet of bedrock tunnel. The equipment consists of 2 miles of ditch, a reservoir 30 feet by 10 feet by 4 feet deep, sluice boxes, and pole and Hungarian riffles. There are cabin, blacksmith shop, drills and tools and one ore car. Works six months during the winter season.

Schroeder Placer Mine. Consists of one patented claim owned by J. A. Schroeder, C. J. Schroeder, P. W. Judkins and C. H. Weston and located in Sec. 16, T. 4 S., R. 18 E., M. D. M., 20 miles by wagon road from Bagby. These are bench diggings and the gravel is medium wash with some clay and boulders on a porphyry bedrock. The development consists of about 5 acres that have been washed off by ground sluicing with a canvas hose. A tunnel 50 feet long is being extended. The equipment consists of 3 ditch lines, having a total length of 5½ miles, 1500 feet of 8-inch pipe, sluice boxes and riffles. It is being worked each winter.

The Garden Placer Claim. Consists of one patented claim owned by W. D. Weston and located in Sec. 32, T. 4 S., R. 18 E., M. D. M., 25 miles by wagon road from Bagby. There are 20 acres of bench gravel which is small wash and is worked by ground sluicing during three months in the winter. The bedrock is slate. Pole and Hungarian riffles are used and the gold is fairly coarse.

GRANITE.

Granite abounds in large quantities in Mariposa County of the same variety as the famous granite at Raymond in Madera County, but it is so far from transportation that it is not able to compete at present with that more favorably situated. A granite property consisting of 50 acres of patented land located in Sec. 20, T. 6 S., R. 19 E., M. D. M., was located in 1906 by Guido Vignalo but was deeded to the State for taxes.

It is 15 miles by wagon road from Raymond and the granite is the same as that of the Raymond granite but is not being worked.

MARBLE.

There is a very fine marble located in Sec. 2, T. 4 S., R. 19 E., M. D. M., 6 miles southwest of El Portal on the road to Hites Cove and on the south fork of the Merced River. It is owned by F. A. Bondshu, J. F. Harris, C. P. Pratt and J. W. Pratt of Mariposa. The limestone is about 3000 feet wide and stands 600 feet from the river. The marble is white with dark streaks through it and takes a fine polish.

Croppings of white marble on the south fork of the Merced River near Hites Cove, Mariposa County, California.

MEERSCHAUM.

Meerschaum has been found on a copper claim just east of the town of Mariposa located in Sec. 30, T. 5 S., R. 19 E., M. D. M., and located by Thomas A. Schlagerty of Mariposa. The quantity is not very large but the quality is excellent.

PHOSPHORETIC ZINCBLENDE.

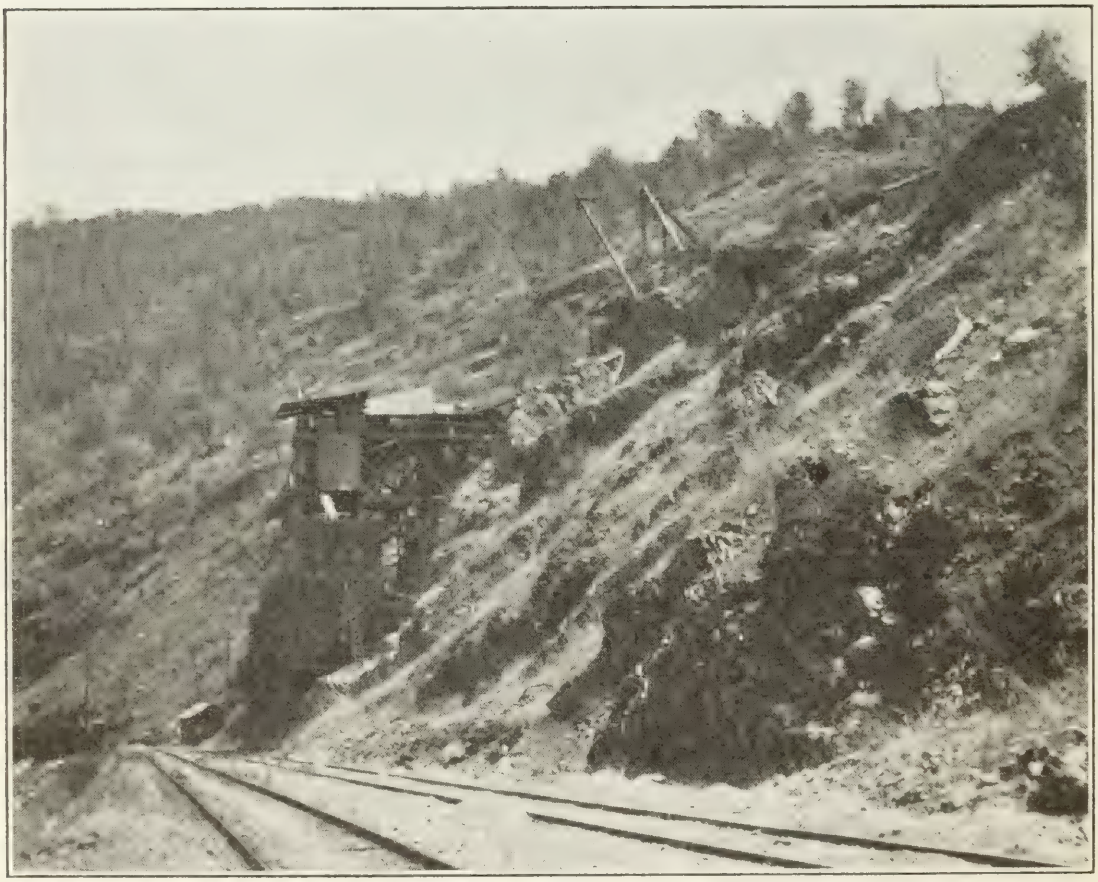
The Aposozein Manufacturing Company of 512 Mission street, San Francisco, owns 80 acres of grazing land in Secs. 9 and 10, T. 4 S., R. 15 E., M. D. M., upon which there is a ledge of schist containing phosphoretic zincblende which is being ground by the Natura Company of San Francisco and sold under the name of ''Akoz'' as a curative for various ailments. The rock has the peculiar property of imparting a glow when scratched with a knife or piece of steel.

QUICKSILVER.

There is a quartz ledge on the Merced River at Horseshoe Bar that has a north and south strike and carries crystallized cinnabar on the footwall side. It is not in sufficient quantity to be of commercial value but merely as a note of interest. See Geological Survey of California (Vol. 1) by Whitney for mention of it.

ROCK QUARRIES.

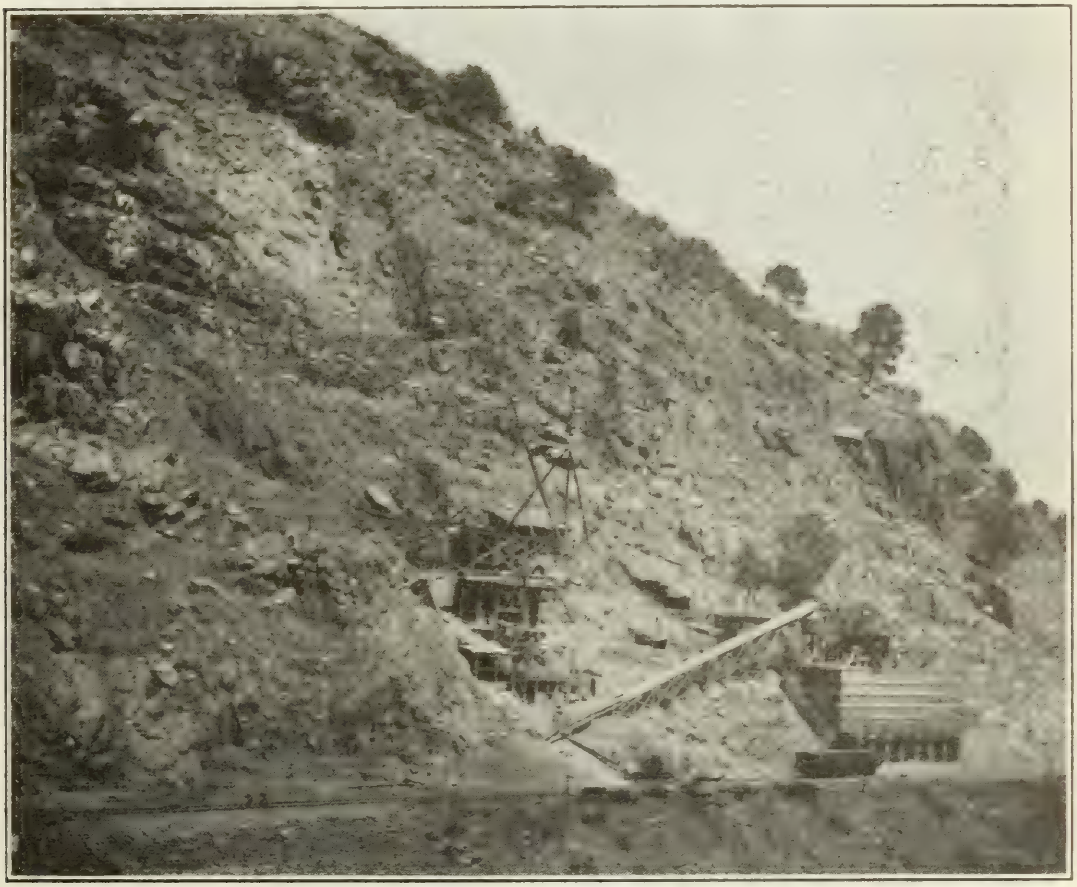
Yosemite Rock Quarry. This quarry consists of 80 acres owned by the Merced Stone Company and leased by the E. B. & A. L. Stone Company, Rialto Building, San Francisco. The quarry and plant are



Merced Stone Company's rock quarry at Jasper Point on the Merced River and the Yosemite Valley Railroad, Mariposa County, California.

located on the Merced River at Jasper Point in Sec. 19, T. 3 S., R. 16 E., M. D. M. The rock is an altered quartzite, very hard and of a jaspery nature. The equipment consists of a steam shovel, compressor and air drills, three gyratory crushers, screens, bucket conveyors, bins, electric motors, power line and transformer house. Power is obtained from the San Joaquin Light and Power Company. The capacity of the plant is 750 tons per ten hours and the rock is sold at from 20 to 30 cents per ton on the cars of the Yosemite Valley Railroad. Only a few men were at work when the property was visited.

Yosemite Stone Quarry. This property consists of 40 acres of patented land owned by the Ransome-Crummey Company of Oakland and located on the Merced River at Exchequer on the Yosemite Valley Railroad. The rock is a fine grained diorite and the dike is about 500 feet wide between the walls of slate. The equipment consists of an air compressor and 5 machine drills, a blacksmith shop, gravity tram, two 5-ton cars, 5 Gates gyratory crushers, elevating buckets, 10 motors, one 100-ton ore bin, a large crane, office, and superintendent's house. Power is supplied by the San Joaquin Light and Power Company and 20 men are employed at the present time.

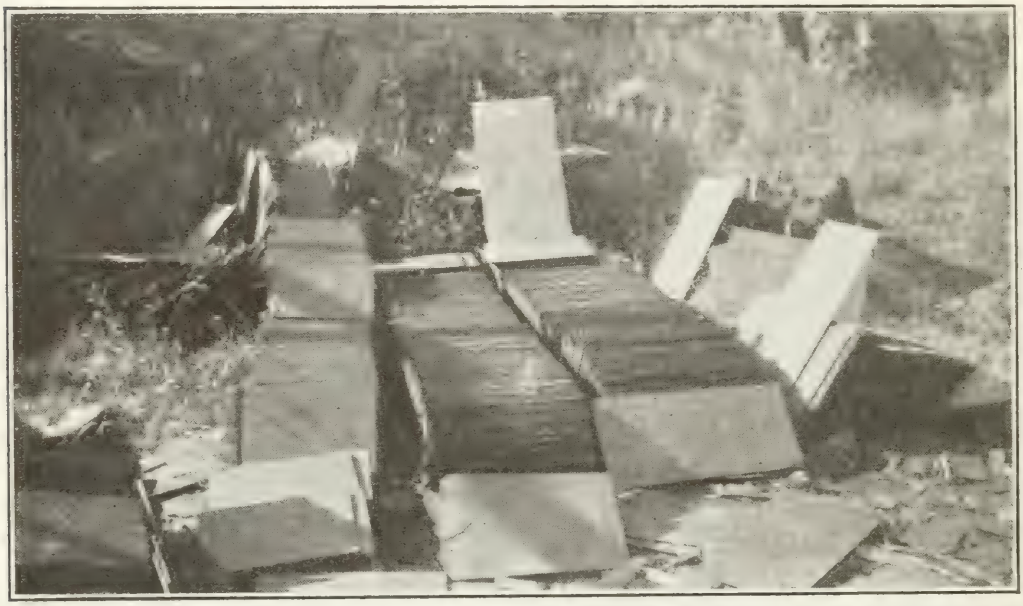


Ransome-Crummey rock crusher at Exchequer, on the Merced River and Yosemite Valley railroad, Mariposa County, California.

SLATE.

Cunningham Slate Quarry. Consists of slate land located in Secs. 6, 7, 8, and 17, T. 7 S., R. 17 E., M. D. M., and owned by the Cunningham Corporation of Planada, Merced County. The quarry was leased from Cunningham by D. J. Gonyer for fifteen years. The quarry is developed and a good quality of roofing slate produced. It is not working at present.

Pacific Slate Quarry. Consists of 50 acres of land located in Sec. 6, T. 6 S., R. 16 E., M. D. M., 4 miles from Merced Falls and owned by the Pacific Slate Company of Merced, Merced County. The slate is quarried and cut into slabs for roofing purposes mostly. None is being shipped at present, as there is very little demand.



Roofing slate from quarry of Pacific Slate Company in Sec. 6, T. 6 S., R. 16 E.,

Slate Quarry of Pacific Slate Company of Merced, in Sec. 6, T. 6 S., R. 16 E., M. D. M.

MERCED COUNTY.

By F. L. LOWELL, Field Assistant.

Field work in September, 1914.

Merced is, strictly speaking, an agricultural county. Most of its 1,276,800 acres of land is under cultivation and the question of water has long been settled by the introduction of a system of irrigating ditches which is augmented by numerous flowing wells.

There is very little mineral in the county and only one gold mining company is operating. The mineral indications are found in the Coast Range mountains in the southwestern part of the county adjoining Santa Clara County and in the northeastern part adjoining Mariposa County.

ASBESTOS.

Asbestos is said to occur near the Mariposa County line in T. 7 and 8 S., R. 16 E., M. D. M. No work has been done on it and no information could be obtained about it.

CLAY.

A white clay said to be suitable for the manufacture of pottery when mixed with other clay that gives it the required fatty consistency is found in the region of Merced Falls, on the land owned by M. Goldman, of Merced. It is not being worked although many experiments have been made with it to test the quality. Clay also is said to be found in T. 5 S., R. 14 E.

COPPER.

Copper has been found in the south end of the county but not in sufficient quantities to pay commercially.

Jose Copper Claim. This claim is located in Sec. 4, T. 13 S., R. 9 E., M. D. M., about 35 miles from Hollister, San Benito County. The ledge proper has not been discovered, but what appears to have been a slide from the ore body has been developed by a 500-foot tunnel. A small quantity of chalcopyrite running high in gold and silver values was found. The claim has been idle for a number of years.

Victor Bonanza Group. This group of copper claims is located in Secs. 14, 15, 16, 23, 24 and 25, T. 13 S., R. 9 E., and Secs. 30 and 31, T. 13 S., R. 10 E., M. D. M., 16 miles from Dos Palos. Native copper and chalcopyrite have been found in the croppings. The formation is sandstone and porphyry. Practically no development has been done. (See "Copper Resources of California," Bulletin No. 50.)

Yosemite Gold Dredging and Mining Company's dredge at Snelling, Merced County, California.

GOLD.

The only gold mining that is being done at present is that at Snelling on the Merced River where the Yosemite Gold Dredging and Mining Company operates a dredge on their 400 acres along the river. The gravel is a clean wash and quite free from clay or large boulders. The gravel averages 20 feet to bedrock and a total of 24,200 cubic yards averaged 16½ cents per yard, and working costs 6½ cents per yard. The gold is coarse, clean and easy to save. The electric power is supplied from their own plant on the Merced River which is about 1½ miles from the dredge and costs not over 1¾ cents per kilowatt hour. (See "Gold Dredging in California," Bulletin No. 57.)

MANGANESE.

Briggs Mine. This mine is owned by N. C. Briggs, of Hollister, San Benito County, and is located in Sec. 16, T. 13 S., R. 9 E., M. D. M. The manganese deposit is claimed to show on the surface over a width of 100 to 200 feet. Very little development work has been done. (See "Structural and Industrial Materials of California," Bulletin No. 38, for Manganese, also U. S. G. S. Bulletin No. 427.)

WATER.

As said before, this county is well supplied with water, both from wells which reach water at a comparatively short distance from the surface, and also from the four irrigating systems whose canals traverse the county. Among these four systems is the Crocker and Huffman Land and Water Company, which also supplies the city of Merced with municipal water.

SAN JOAQUIN COUNTY.

By F. L. LOWELL, FIELD ASSISTANT.

Field work in August, 1914.

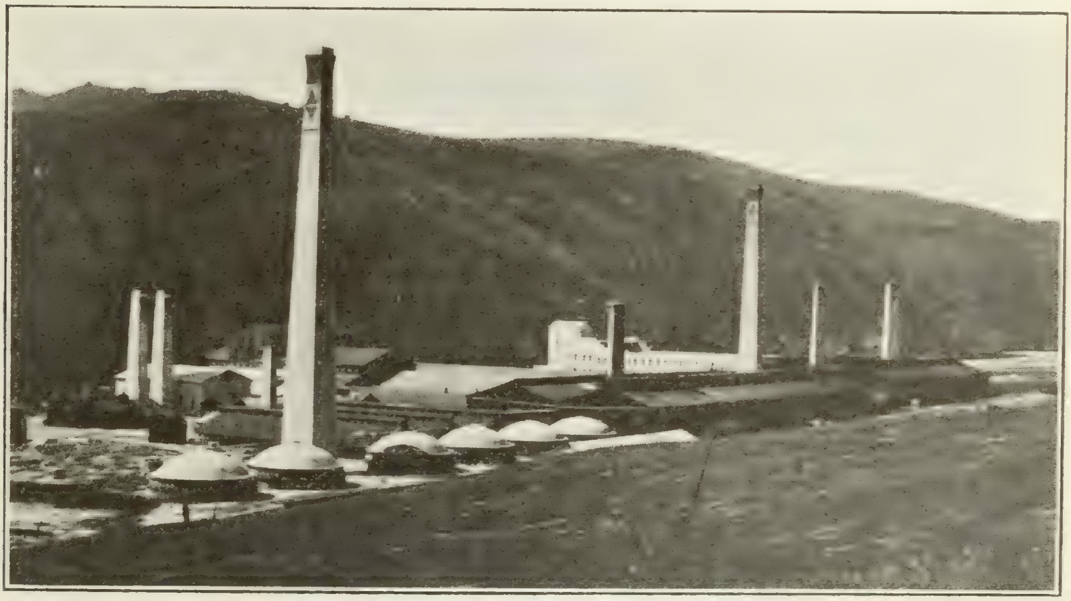
San Joaquin County, of which Stockton is the county seat, has an area of 1370 square miles or approximately 926,720 acres. Of this acreage 763,048 acres are in farm lands. The population of the county was 50,731 in 1910. The county may be classed as agricultural and very little mineral is found in commercial quantities to pay for working.

The principal output under a mineral head is natural gas. There is also some manganese, clay and indications of coal in the Corral Hollow district in the southern end of the county. Water is abundant and is obtained from wells and irrigation ditches. The county is bounded on the north by Sacramento County, on the northeast by Amador and Calaveras counties, on the east and southeast by Stanislaus County, on the southwest by Alameda County and on the west by Contra Costa County.

BUILDING MATERIALS.

Brick and pottery.

Carnegie Brick and Pottery Company. This company, which owns the E. ½ of Sec. 33, and the W. ½ of Sec. 34, T. 3 S., R. 4 E., M. D. M., has a very extensive plant for the manufacture of brick and terra cotta on the Tesla line of the Western Pacific Railroad at Carnegie. The clay came from the Tesla coal mine in Alameda County and was hoisted from the underground workings and conveyed by railroad to the brick plant. The plant includes forty-five brick kilns



Carnegie Brick and Pottery Company's Plant at Carnegie, San Joaquin County, California. Photo by Walter W. Bradley.

Floor construction of a brick kiln at the Carnegie Brick and Pottery Plant, San Joaquin County, California. Photo by Walter W. Bradley.

and the equipment cost in the neighborhood of half a million dollars. It has not been in operation since 1912. The brick and terra cotta plant is in San Joaquin County and the mine and pottery plant are in Alameda County.

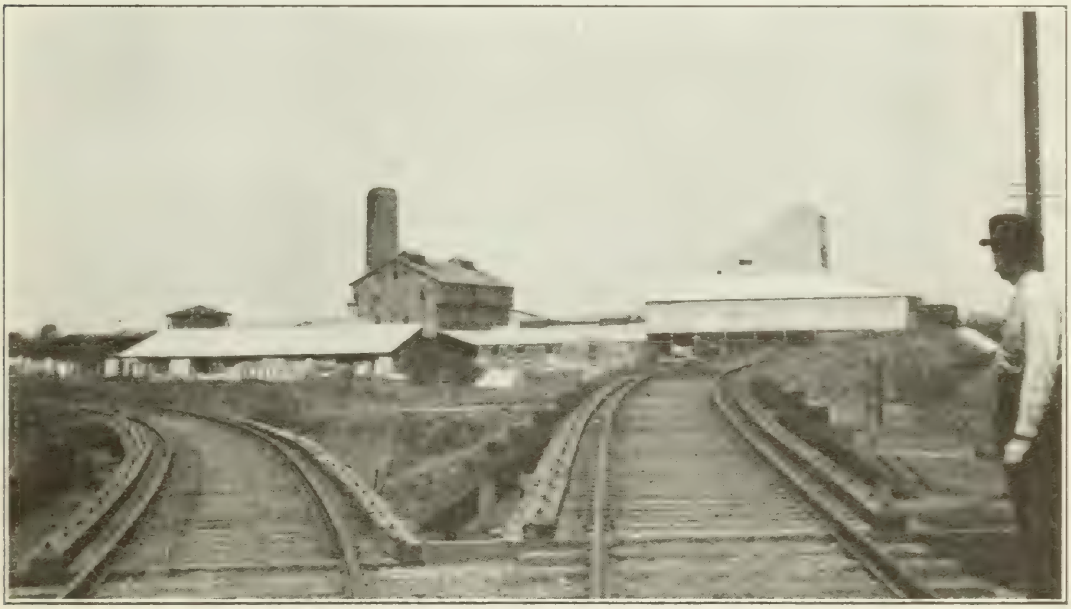
San Joaquin Brick Company Plant (red brick). This property consists of sixty acres of clay land on Roberts Island, outside of Stockton, and is a consolidation of the San Joaquin Brick Company plant and the Roberts Island Brick Company plant, with offices at 33 South El Dorado street, Stockton. The clay is dredged from the slough by a Marion steam dredger and allowed to weather in the air before it is used for making the common red brick.

The plant consists of 2 kilns, 2 brick machines, 2 brick cutters, one 40 h.p. motor, one steam shovel on a barge, dry sheds and other buildings. Forty men are employed and the plant has a capacity of 40,000 brick per day with one unit and could produce 80,000 with another unit operating.

Stockton Fire and Enamel Brick Company Plant. The plant is located on the outskirts of the city of Stockton near the glass works and Jackson baths, and consists of 5 brick kilns, 2 brick pressing machines,

Roberts Island Brick Plant, owned by the San Joaquin Brick Company of Stockton, San Joaquin County, California.

2 cutting machines, pugmill, dry pan, oil tanks, 2 boilers and a steam engine. The brick machinery is run by four motors, the power being supplied by the Western States Gas and Electric Company. Twenty-five men are employed. This company manufactures fire-brick, face brick, hand moulded material, and linings. The clay comes from Carnegie, Ione, Valley Springs and Lincoln. The capacity of the plant



Stockton Fire and Enamel Brick Company's plant at Stockton, San Joaquin County, California.

is 50,000 brick per day, besides hand moulded material. Red brick is not manufactured. The plant has been working two years and is on a spur track of the Southern Pacific Railroad.

NATURAL GAS.

Natural gas has been a very important factor in the fuel question of the manufacturing industries of San Joaquin County and, together with the cheap water transportation to San Francisco Bay, gives the city of Stockton an enviable advantage over other valley cities. Most of the natural gas wells of the county that have produced or are producing at the present time are located in the vicinity of Stockton. It has been stated before that the flow of water with the flow of gas is merely "incidental and not the necessary concomitant of gas." I did not find this to be altogether correct as in nearly all cases where the flow of water has diminished, the gas also has diminished, and at the present time some of the wells are being "forced;" in other words, the gas is forced back into the well to create a greater flow of water, as a greater flow invariably carries an increased flow of gas. The gas wells at the state asylum are kept alive and producing by this method. The wells at this institution are becoming filled up with sand and the supply of gas is now hardly adequate for their use. The officials consider that a natural gas well is a paying investment and would like to have a new well bored for their increasing demand. The first gas well in the county was bored, not for gas, in fact it was not known that gas lay in the strata below, but was drilled in order to get a flow of artesian water that would flow into one of the sloughs, thereby clearing the slough of stagnant water and removing objectionable odors. When the water was tapped gas also began to flow and the casing was capped and later a gasometer was put on the top and the gas was sold to a few customers. This company put down one other well and has a franchise from the city of Stockton for its pipe mains and supplies about 250 customers, but are not extending the business. This company, called the Central Natural Gas Company, and the Western States Gas and Electric Company, are the only two companies that are marketing the gas. There are several other gas wells owned by individuals, the gas from which is used locally for fuel and light.

Central Natural Gas Company. This company owns two gas wells located in the town limits of Stockton. The first well, or No. 1, was put down about eighteen years ago at American street and Miner avenue and went to a depth of about 1400 feet. Began drilling in 1893 and finished in 1899. The original flow was 32,000 cu. ft. but now flows 5000 cu. ft. per day. No. 2 well, which is located on Mr. Hoyle Greenwood's property at 229 North San Joaquin street, was drilled with a rig similar to the Keystone drill, to a total depth of 2838 feet about seven years ago. The well was started with a 16-inch casing and this was reduced to 14, 12, 10 and finally to 6-inch casing at the bottom. The original flow was 100,000 cu. ft. per day.

Analysis of the Gas.

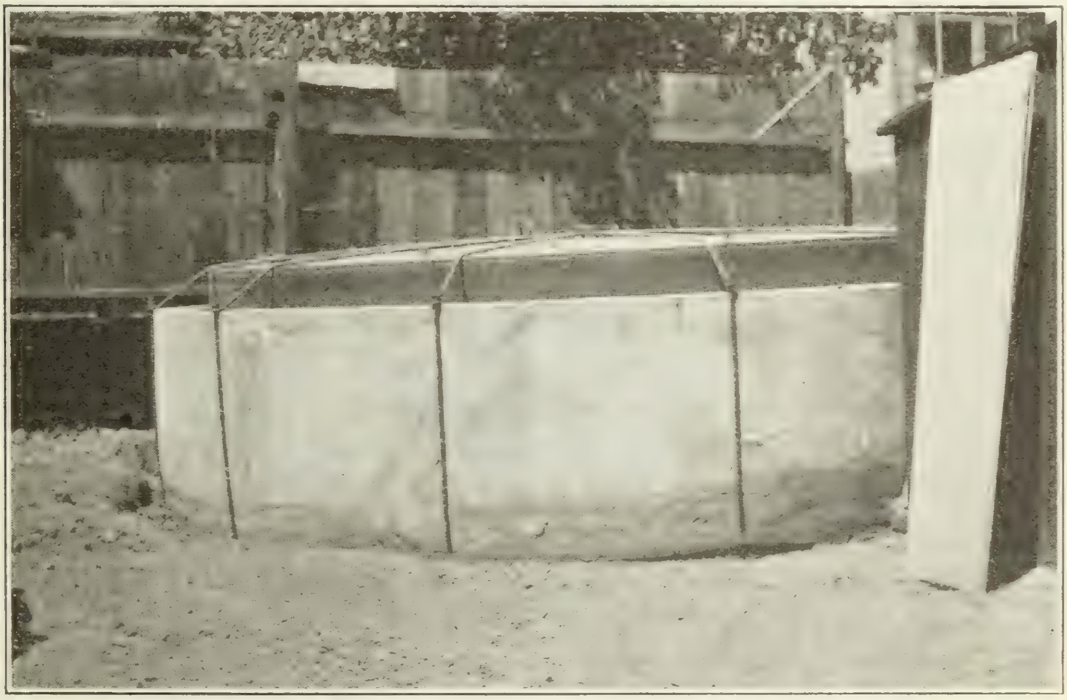
	Per cent by volume	Second analysis
Heavy hydrocarbon CNH_2N	.0	.0
Marsh gas CH_4	73.2	76.4
Hydrogen H_2	.0	.0
Carbonic oxide CO	0.9	0.1
Carbonic acid gas CO_2	0.1	0.4
Oxygen O_2	0.3	0.3
Residual nitrogen N_2	25.5	22.8
Specific gravity (Air 1)	0.663	
Gross B. T. U.	788	819
Per cent combustible	74.1	
Noncombustible	25.9	

Sulphur 60 grams per 100,000 feet.

Heats of combustion used for B. T. U. calculation: CNH_2N 2,000, CO 343, CH_4 1073, H_2 344,

Temperature of the water at a depth of 2,838 feet was 104°. Temperature at the present time is 95°.

The flow of gas from the No. 2 well at the present time is from 30,000 to 40,000 cu. ft. per 24 hours, calculated from the amount sold to customers, there being no meter connected. No log has been kept of the well, but Mr. Greenwood says that strata of sand and gravel were encountered from the surface to a depth of 350 feet, also blue clay and lava, and from that point down cobblestones were encountered. Gas was tapped at the 1200-foot point and was accompanied with water. Water always accompanies the gas.



Central Natural Gas Company's well at 229 North San Joaquin street, Stockton, San Joaquin County, California.

The No. 1 well has not been producing gas for some time and needs to be cleaned out and new casing put in. The company has 250 customers and a franchise for its pipes in the city but is not extending its scope of operations.

The water flowing from the wells is not used for any purpose but flows into the sloughs, thereby keeping them free from stagnation. N. E. Carpenter is president of the company, 29 North Grant street, and Hoyle Greenwood is secretary, 229 North San Joaquin street.

Clark Gas Well. This well is located at Lincoln and South streets, in the city limits of Stockton, and is owned by Mrs. Percival. It was bored twenty-five years ago and had a gas flow for some years but has now ceased flowing.

Court House Gas Well. Located in the yard of the jail in Stockton and was started in 1890 and bored to a depth of 1900 feet. The casing at the top was 12 inches in diameter. It had a flow of 30,000 cubic feet per day, but is now dead.

Cowan Gas Well. Located on West Lane road, six miles from Stockton, and owned by T. C. Cowan. The well was drilled twenty-three years ago to a depth of 1160 feet. Enough gas flowed to supply the domestic demand for lighting and fuel. The water flowing from the well is not used as it is injurious to vegetable life. This well is still producing.

Crown Mills Gas Well. Located at the Crown flour mill and was drilled in 1887 to a depth of 1330 feet. It has a 9-inch casing and formerly flowed at the rate of 7000 cu. ft., but is now dead. The gas was used for lighting the mill and also for fuel in the boiler house.

Lathrop Gas Well. Located in the town of Lathrop. It was drilled in 1888 to a depth of 1420 feet and had 8-inch casing from top to bottom. The flow of water rose two feet above the collar of the casing and was estimated at 300,000 gallons per 24 hours. The well also produced 3000 cu. ft. of gas per day, but has been dead for a long period.

Roberts Island Gas Well. Located on the Kidd ranch on Roberts Island. It was drilled about twenty-five years ago and had a small flow of gas, but is dead now.

Salmon Gas Well. Located on Atlanta road just below French Camp, ¼ of a mile from Sharp Lane. It was bored about thirty years ago and had a small flow of gas, but is dead now.

St. Agnes College Wells. Located in the grounds of St. Agnes Convent in Stockton. The two wells were drilled to a depth of 960 and 1720 feet respectively and had 10-inch casing. They produced 25,000 cu. ft. of gas per day, which was used for fuel and illuminating purposes in the convent. The wells are filled with sand and are dead now.

Stockton State Hospital Wells, Nos. 1 and 2. Located at the hospital for the insane at Stockton. Well No. 1 was drilled about twenty years ago to a depth of 1600 feet with 8-inch casing. It has been dry for three years. The temperature of the water was 84° and highly charged with magnesia and iron.

Well No. 2 was drilled at about the same time as well No. 1, with 16-inch casing at the top. This well is being "forced" at the present time to increase the flow of gas. The water is conveyed to a swimming pool for the patients' use. The gas is used for cooking purposes about the asylum, but the supply is not equal to the demand as the flow is not over 900 cu. ft. per day. The well is badly filled with sand.

Western States Gas and Electric Company Gas Wells. The Western States Gas and Electric Company is an incorporated company with its home office in San Francisco and doing business in Stockton with its local office at 44 North Sutter street. H. M. Byllesby of Chicago is president; Samuel Kahn of Stockton, vice president and general manager, and Allen L. Chickering of San Francisco, secretary. The company owns an extensive gas manufacturing plant and electric plant as well as sixteen natural gas wells, five of which have ceased to flow. The natural gas is all piped to the central plant and mixed with the manufactured gas and then goes to the consumer. The company owns most of the natural gas wells now producing. The water flowing from their wells is not utilized except in the case of the Jackson No. 2 well, which supplies water for the swimming tank of the Jackson baths which adjoin.

Natural Gas Wells owned by Western States Gas and Electric Company of Stockton, California:

Well No. 1.

Located at Lafayette and Lincoln streets.
Began drilling in 1892 and finished in 1896.
Total depth of 1702 feet.
Twelve and 8-inch casing.
Not flowing at present.
Original flow was 15,400 cu. ft. per day.
Water flow was 200 gallons per minute.
Well is now dead.

Well No. 2.

Formerly owned by the Stockton Natural Gas Company.
Located at Lafayette and Lincoln streets.
Began drilling in 1886 and finished in 1888.
Twelve-inch and 7-inch casing.
Original flow was 87,000 cu. ft. per day.
Water flow was 1500 gallons per minute.
Well is now dead.

Well No. 3.

Formerly owned by the Stockton Natural Gas Company.

Located at Lafayette and Lincoln streets.

Began drilling in 1888 and finished in 1890.

Total depth of 1890 feet.

Twelve-inch and 6-inch casing.

Original flow was 40,000 cu. ft. per day.

Flowing now 12,000 cu. ft. per day.

Temperature of water is 86°.

CH_4	67.1%
CO	0.6%
CO_2	0.2%
O	0.5%
N	31.6%

Well No. 4.

Formerly owned by the Northern Natural Gas Company.

Located at Grant and Fremont streets.

Began drilling in 1892 and finished in 1894.

Total depth of 1720 feet.

Twelve and 6-inch casing.

Original flow was 20,000 cu. ft. per day.

Flows now at rate of 5000 cu. ft. per day.

Original flow of water was 1800 gallons per minute, but much less now.

Temperature of water is 83° F.

CH_4	57.9%
CO	0.6%
CO_2	0.2%
O	0.8%
N	40.5%

Well No. 5.

Located at North and Hunter streets.

Began drilling in 1895 and finished in 1896.

Total depth of 2071 feet.

Twelve and 6-inch casing.

Original flow was 43,300 cu. ft.

Flow is now 30,000 cu. ft. per day.

Flow of water is 300 gallons per minute.

Temperature of water is 86° F.

CH_4	64.5%
CO	0.7%
CO_2	0.4%
O	0.6%
N	33.8%

Well No. 6.

Located at Anderson and Pilgrim streets.

Started in 1895 and finished in 1896.

Total depth of 1810 feet.

Twelve-inch casing at the top and 7-inch at bottom.

Original flow was 28,899 cu. ft. per day.

Flow now 16,000 cu. ft. per day.

Water flow 800 gallons per minute.

Temperature of water is 86° F.

CH_4	67.2%
CO	0.3%
CO_2	0.4%
O	0.7%
N	31.4%

Well No. 7.

Located at Miner avenue and Harrison street.

Started in 1898 and finished in 1900.

Total depth of 2230 feet.

Twelve, $10\frac{1}{2}$, 9, and $7\frac{1}{2}$-inch casing.

Original flow was 72,000 cu. ft. per day.

Flow now is 35,000 cu. ft. per day.

Water flow was 1800 gallons per minute.

Water flow now is 300 gallons per minute.

Temperature of the water is 93° F.

CH_4	66.0%
CO	0.9%
CO_2	0.2%
O	0.6%
N	32.3%

Well No. 8.

Located at El Dorado, between Channel and Miner streets.

Started in 1904 and finished in 1912.

Total depth of 3178 feet.

Sixteen, $14\frac{1}{2}$, 13, 12, 9, $6\frac{1}{2}$-inch casing.

Formerly flowed 60,000 cu. ft. per day.

Now flows 39,000 cu. ft. per day.

Water flow about 504,000 gallons per day.

Temperature of water, 94° F.

Well cost about $75,000.

CH_4	73.5%
CO	0.6%
O	0.2%
N	25.3%

(See attached sheet of log, page 194.)

Well No. 9.

Located at Miner avenue and East street.

Started in 1902 and finished in 1908.

Total depth of 2603 feet.

Sixteen, 14½, 13 and 12-inch casing.

Formerly flowed 120,000 cu. ft. per day.

Now flows 85,000 cu. ft. per day.

Water flow is 720,000 gallons per day.

Temperature of water is 96° F.

CH_4	70.8%
CO	0.5%
CO_2	0.1%
O	0.3%
N	28.3%

(See attached sheet of log, page 195.)

Well No. 10.

Formerly belonged to Northern Natural Gas Company.

Located at Acacia, between San Joaquin and Hunter streets.

No record of time the well was drilled.

Total depth, 2006 feet.

Twelve, 10½, 8½, 7 and 6-inch casing.

No record of original flow.

One of the oldest wells in this district.

Well is now dead.

CH_4	66.0%
CO	1.4%
CO_2	0.4%
O	0.9%
N	31.3%

Citizens No. 1.

Formerly owned by the Citizens Natural Gas Company.

Located on Commerce street, between Rose and Vine streets.

No records of the well to be obtained.

Water flowed at rate of 800 gallons per minute.

Well is now dead.

Citizens No. 2.

Formerly owned by the Citizens Natural Gas Company.

Located at North and Addison streets.

Total depth is 1850 feet.

Twelve, 10 and 8-inch casing.

Present flow is 39,000 feet per day.

Temperature of the water is 86° F.

CH_4	68.1%
CO	0.4%
CO_2	0.3%
O	0.7%
N	30.5%

Jackson No. 1.

Originally owned by John Jackson.

Located at San Joaquin and Tenth streets.

Started in 1894 and finished in 1896.

Total depth of 1702 feet.

Twelve and 6-inch casing.

Originally flowed 30,000 cu. ft. per day.

Well is now dead.

Water flow 600 gallons per minute.

CH_4	59.5%
CO	0.6%
CO_2	0.4%
O	0.4%
N	39.1%

(For both Jackson No. 1 and No. 2.)

Jackson No. 2.

Formerly belonged to John Jackson.

Located at San Joaquin and Tenth streets.

Started in 1895 and finished in 1898.

Total depth of 1600 feet.

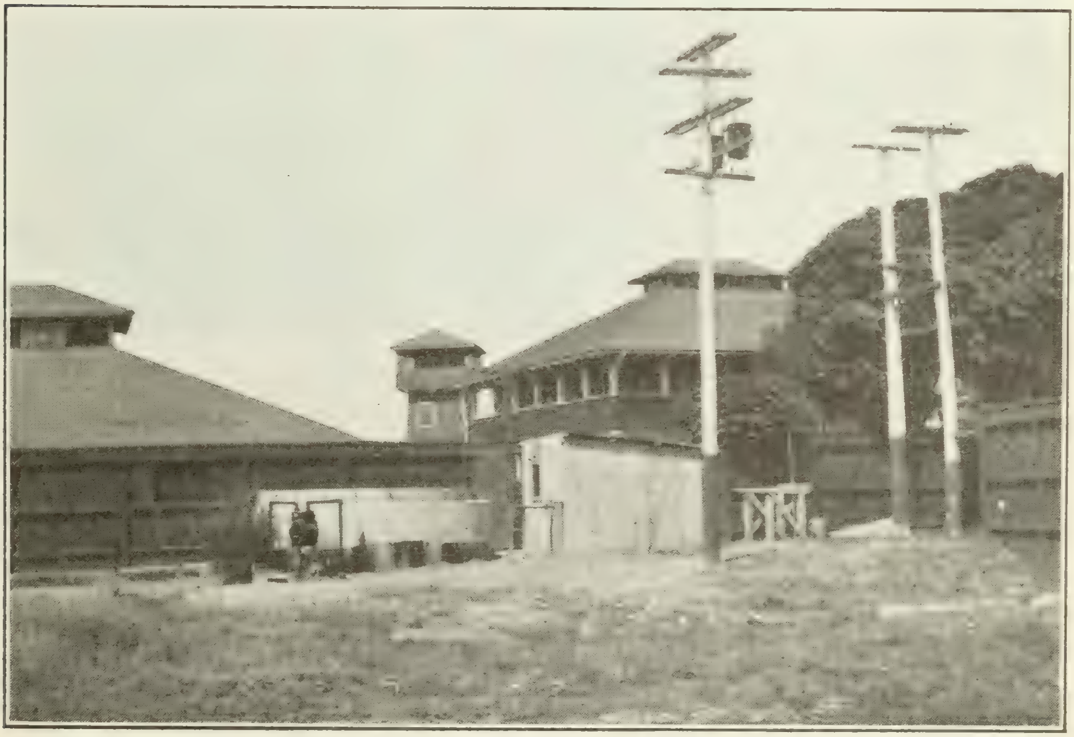
Twelve and 7-inch casing.

Flowing originally 35,000 cu. ft. per day.

Now flows 6,000 cu. ft. per day.

Water flow originally 600 gallons per minute.

Temperature of water 84° F.



Jackson No. 2 well at Jackson Baths, belonging to the Western States Gas and Electric Company of Stockton, San Joaquin County, California.

Glass Works Well No. 1.

Formerly belonged to Stockton Window Glass Company.

Located at San Joaquin and Fourteenth streets.

Well drilled in about 1904.

Total depth 2000 feet.

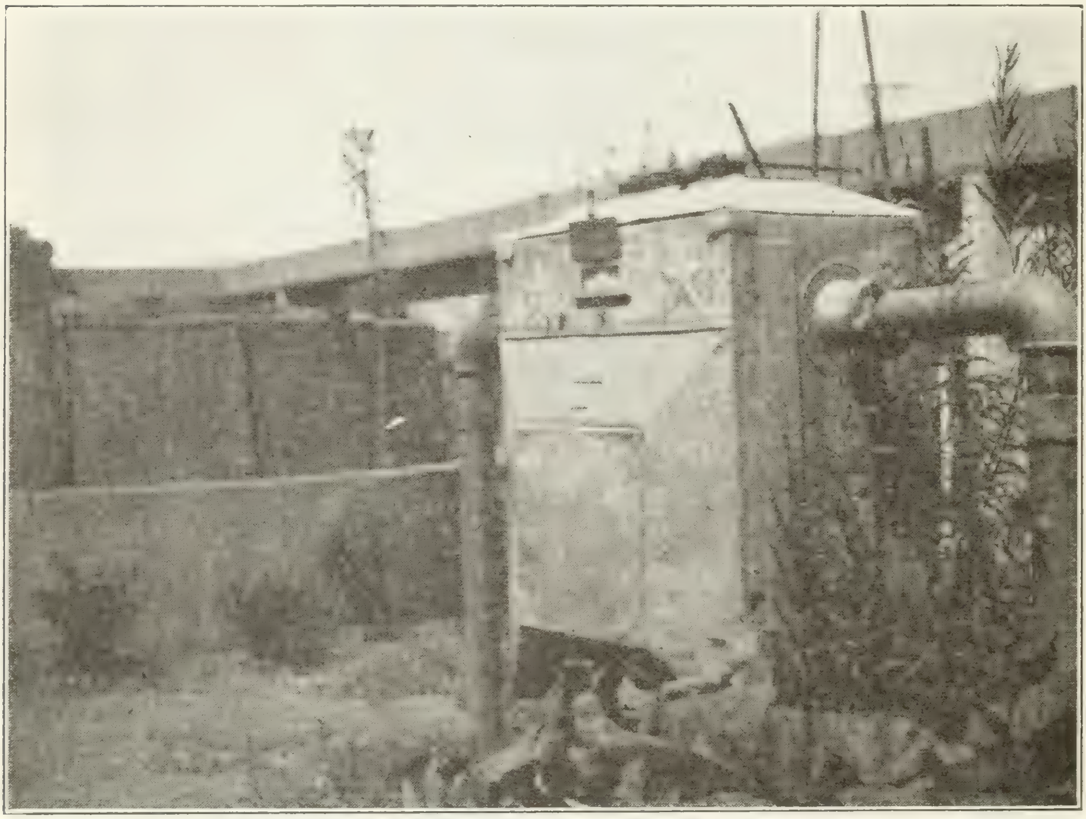
Twelve and 6-inch casing.

Flows 16,000 cu. ft. per day.

Water flow about 250 gallons per minute.

Temperature of water 92° F.

CH_4	69.8%
CO	0.7%
CO_2	0.4%
O	0.3%
N	28.8%



Gasometer and meter of a natural gas well in Stockton, belonging to the Western States Gas and Electric Company.

Glass Works Well No. 2.

Formerly owned by the Stockton Window Glass Company.

Located at San Joaquin and Fourteenth streets.

No record of the date when the well was drilled. Think it was drilled about 1904.

Total depth 2100 feet.

Twelve and 6-inch casing.

Flows 7000 cu. ft. per day.

Water flow about 150 gallons per minute.

Temperature of water is 90° F.

Log of Well No. 7.

Formation.	Feet	to feet.
Adobe	0	3
Yellow clay	3	24
Blue clay	24	45
Sand and small stone	45	51
Blue clay	51	154
Cemented blue clay	154	164
Coarse sand	164	184
Clay	184	190
Sand, gravel and stone	190	238
Blue clay	238	242
Loose sand	242	340
Blue clay	340	354
Cement sand	354	651
Blue clay	651	655
Loose sand	655	726
Clay	726	731
Sand	731	768
Clay	768	786
Sand and cemented clay	786	840
Tough blue clay	840	897
Hard clay	897	915
Tough clay	915	928
Hard clay	928	956
Coarse clay	956	1,076
Clay	1,076	1,083
Sand	1,083	1,115
Clay	1,115	1,122
Loose sand	1,122	1,174
Clay	1,174	1,212
Coarse sand and stone	1,212	1,274
Small stone	1,274	1,290
Hard clay	1,290	1,346
Packed sand	1,346	1,354
Hard clay	1,354	1,382
Sand and pebbles	1,382	1,386
Hard clay	1,386	1,436
Coarse sand	1,436	1,439
Tough clay	1,439	1,452
Hard clay	1,452	1,517
Tough clay	1,517	1,532
Hard clay	1,532	1,560
Sand	1,560	1,563
Hard clay	1,563	1,594
Tough clay	1,594	1,598
Hard clay	1,598	1,674
Sand	1,674	1,689
Clay	1,689	1,723
Loose sand	1,723	1,733
Clay	1,733	1,777
Loose sand	1,777	1,795
Clay	1,795	1,798
Sand	1,798	1,804
Clay	1,804	1,811
Loose sand	1,811	1,813
Clay	1,813	1,868
Loose sand	1,868	1,886
Clay	1,886	1,961
Sand	1,961	1,969
Clay	1,969	2,053
Loose sand	2,053	2,063
Clay	2,063	2,068
Loose sand	2,068	2,093
Clay	2,093	2,193
Sand	2,193	2,194
Hard cemented clay	2,194	2,206
Loose sand	2,206	2,213
Hard cemented clay	2,213	2,222
Loose sand	2,222	2,230

Log of Well No. 8.

Formation.	Feet	to feet.
Clay	0	25
Sand	25	29
Clay	29	65
Sand	65	68
Clay	68	196
Gravel	196	202
Clay	202	220
Gravel	220	232
Clay	232	334
Sand	334	345
Clay	345	384
Sand	384	390
Clay	390	440
Sand	440	448
Clay	448	680
Sand	680	700
Clay	700	710
Sand	710	728
Clay	728	760
Sand	760	768
Clay	768	818
Sand	818	826
Clay	826	975
Sand	975	982
Clay	982	1,019
Sand	1,019	1,030
Clay	1,030	1,243
Gravel	1,243	1,253
Clay	1,253	1,460
Sand	1,460	1,468
Clay	1,468	1,616
Sand	1,616	1,619
Clay	1,619	1,725
Sand	1,725	1,738
Clay	1,738	1,960
Sand	1,960	1,970
Red clay	1,970	1,980
Yellow clay	1,980	2,000
Blue and white clay	2,000	2,120
Sand	2,120	2,132
Sticky blue clay	2,132	2,600
Sand	2,600	2,607
Gravel	2,607	2,648
Blue clay	2,648	2,700
Red clay	2,700	2,790
Black clay	2,790	2,800
Sand	2,800	2,845
Gravel	2,845	2,880
Sand	2,880	2,900
Gravel	2,900	2,907
Brown clay	2,907	3,060
Black sand	3,060	3,175
Blue clay	3,175	3,178

Log of Well No. 9.

Formation.	Feet	to feet.
Adobe	0	2
Yellow clay	2	14
Sand	14	17
Clay	17	82
Blue clay	82	174
Yellow clay	174	190
Sand	190	220
Blue clay	220	232
Black sand	232	240
Blue clay	240	445
Sand	445	450
Blue clay	450	485
Coarse white sand	485	492
Blue clay	492	584
Sand	584	588
Blue clay	588	605
Sand	605	614
Blue clay	614	698
Sand	698	705
Blue clay	705	1,056
Coarse sand	1,056	1,061
Blue clay	1,061	1,190
Coarse sand	1,190	1,205
Hard blue clay	1,205	1,338
Cemented sand and stone	1,338	1,343
Clay	1,343	1,475
Cemented sand and stone	1,475	1,483
Clay	1,483	1,608
Loose sand and stone	1,608	1,620
Clay	1,620	1,850
Sand and stone	1,850	1,853
Sand and clay in thin layers	1,853	2,018
Red, white and blue clay	2,018	2,025
Sand	2,025	2,032
Clay	2,032	2,038
Sand	2,038	2,044
Clay	2,044	2,070
Sand	2,070	2,176
Clay	2,176	2,186
Sand	2,186	2,196
Clay and sand in thin layers	2,196	2,500
Clay	2,500	2,600
Sand	2,600	2,603

The first flow of gas was struck at 2025 feet.

The next flow at 2044 feet, and the third flow at 2176 feet.

The best flow of gas was struck at 2600 feet.

This well is the best that the company owns.

MANGANESE.

The characteristic occurrences of manganese in California are in the form of black oxide associated as layers and pockets with the jasper lenses of the Franciscan formation of probable Jurassic age. Manganite seems to be the most prevalent variety of manganese encountered in the Livermore range of hills.

Manganese Prospect. This property consists of the SE. ¼ of Sec. 2, T. 4 S., R. 4 E., and about 1½ miles south by road of the branch line of the Western Pacific Railroad which runs to the Tesla coal mine. The land was formerly owned by J. Caire, who sold it to J. Treadwell and it is now in the hands of Frank J. Symmes, trustee,

Manganese prospect in Sec. 11, T. 4 S., R. 4 E., M. D. M., owned by the Winship Estate. Photo by Walter W. Bradley.

491 California street, San Francisco. According to the Tenth Mineralogist Report, about 2000 feet of tunneling has been done and some stoping, which have caved. No work has been done on the property for eight years. The manganese is in the jasper formation and the lenses vary from one to ten feet in width. There are many manganese coatings on the cherts in these hills but they are not of sufficient purity to be of commercial value.

Manganese Prospect. In Sec. 11, T. 4 S., R. 4 E., M. D. M., owned by the Winship Estate, 354 Pine street, San Francisco, and leased by D. P. and F. M. Doak, of the Rialto Building, San Francisco. This prospect has been working the last few months and has been developing manganese ore.

(See U. S. Geological Survey, Bulletin No. 427, for further reference to Manganese of the State.)

WATER.

The county is well supplied with subterranean water and water from irrigation ditches. Many of the farms of the county rely on their wells for irrigating. Care must be exercised in selecting a water well location that it is not in close proximity to a gas well. Cases have been known where the deeper gas well has contaminated the water well by the gas penetrating the water strata and flowing with the water to the water well. This is especially likely when the casing of the gas well has been worn away thus giving free access to the water strata.

The principal irrigation district of the county takes its water from the Stanislaus River at Knights Ferry in Stanislaus County. This water is owned jointly by the South San Joaquin irrigation district and the Oakdale irrigation district of Stanislaus County, and irrigates 137,000 acres of farm land. There are eight miles of main canal, lateral canals and a storage reservoir with a capacity of 184,000 acre feet.

Woodbridge Canal and Irrigation Company. This company takes water from the Mokelumne River at the town of Woodbridge, and also water from the Calaveras River at the town of Bellota. This company, with its system of canals, irrigates the greater portion of the county north and east of Stockton.

There is another ditch that brings water from Mokelumne River in Calaveras County. This ditch enters San Joaquin County at its northeast corner and supplies water for that section. It is seen that the irrigation problem is thoroughly solved and insures good crops at all times.

Stockton water district.

The city of Stockton is supplied with water from wells which are owned by the Pacific Gas and Electric Company. The water bearing strata are encountered between the depths of 550 feet and 557 feet. The logs of the wells are similar to those of the gas wells. The total solids held in solution amount to 20.85 grains per gallon and are chiefly calcium and magnesium carbonates, a little silica and some alumina. The free ammonia present amounts to 0.062 parts per million parts of water. The albuminoid ammonia amounts to 0.126 parts per million.

PACIFIC GAS AND ELECTRIC COMPANY.

Stockton Water District. Wells at Pumping Station No. 1.

Number	Diameter of casing	Depth	Date of construction	Date last time cleaned	Depth last time cleaned	Location	Cost	Abandoned
1	8-inch at top, 6-inch below 800 feet	1,100	1882	Feb., 1912	1,000	Northeast corner old tract	$2,500 00	
2	6-inch at top, 5-inch below 650 feet	960	1884			Northwest corner of lot, brick sump	2,000 00	
3	8-inch throughout	1,040	1885		955	In street south of pit	2,500 00	1912
4	10-inch throughout	560	1891	Jan. 30, 1914	569½		2,000 00	
5	8-inch throughout	218	1895				2,000 00	
6	8-inch throughout	218	1895				2,500 00	
7	8-inch throughout	300	1895				2,500 00	
8	8-inch throughout	577	1895				2,500 00	
9	12-inch throughout	770	1900	Jan. 16, 1914	770		2,600 00	
10	20-inch throughout	223	1902	Jan. 20, 1914	223		1,612 00	
11	12-inch throughout	950	1906	Jan. 22, 1914	950		3,200 00	
12	14-inch at top, 12-inch below 258 feet	1,002	1907	Jan. 23, 1914	1,002		3,400 00	
13	14-inch at top, 12-inch below 250 feet	1,050	1908–9	Jan. 26, 1914	1,043		3,700 00	
14	20-inch throughout	223	1910	Jan. 15, 1914	223		1,200 00	
15	14-inch 225 feet, 12-inch 605 feet, 10-inch 223 feet	1,053	1911	Feb. 15, 1913	1,053		3,491 53	
16	16-inch 239 feet, 14-inch 598½ feet, 12-inch 214½ feet	1,502	1912	Mar., 1913	1,052		4,283 76	
17	17-inch throughout	201	1912				4,514 81	
18	14-inch top, 12-inch below 861 feet	1,124	1913				4,514 81	
19	16-inch 250 feet, 14-inch 236 feet 12-inch 159 feet	674	1913–4					

There used to be sixty 2-inch wells at Pump Station No. 1, all abandoned between 1906 and 1910.

Wells at Pump Station No. 2.

Number	Diameter of casing	Depth	Date of construction	Date last time cleaned	Depth last time cleaned	Location	Cost	Abandoned
1	12-inch at top, 10-inch below 632 feet	667	1903	Jan. 9, 1914	667			
2	12-inch at top, 10-inch below 594 feet	807	1904	Jan. 10, 1914	798			
3	14-inch at top, 12-inch below 260 feet	975	1909	Jan. 5, 1914	962			
4	14-inch at top, 12-inch below 250 feet, 10-inch below 800 feet	875	1909	Jan. 12, 1914	872			
5	12-inch throughout	671	1912	Jan. 10, 1914	370	Bottom 300 feet caved		

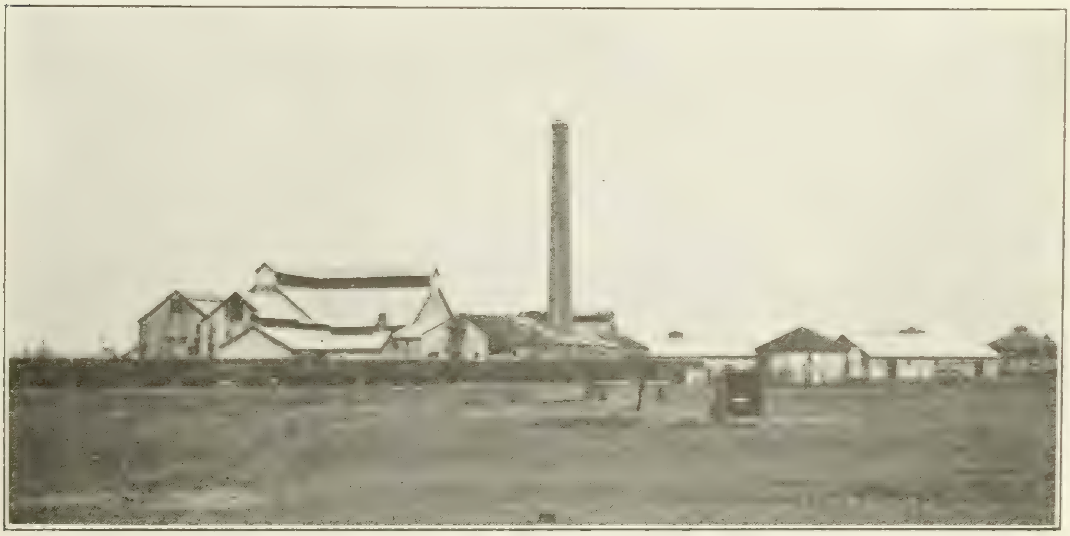
Yearly consumption of water by the city of Stockton.

Year	Gallons consumed	Year	Gallons consumed
1893	678,910,112	1903	796,401,859
1894	515,675,810	1904	708,797,128
1895	704,028.212	1905	837,814,614
1896	679.037.239	1906	942,683,776
1897	781,830,337	1907	943,575,767
1898	936,958.406	1908	1,057,675,182
1899	981,052,765	1909	1,057,552,130
1900	646,591,937	1910	1.166,756,023
1901	648,469,829	1911	1.205,951,517
1902	774.989.079		

Costs—$1.50 per foot for drilling 12-inch to 16-inch well to 1000 feet.

WINDOW GLASS.

Stockton Window Glass Company Plant. This plant, which is located in the suburbs of the city of Stockton, is owned by the Western States Gas and Electric Company of Stockton and was built in 1901. It was operated for a time but closed down in 1908. It is on a spur track of the Southern Pacific Railroad and has a complete equipment for the manufacture of common window glass, chipped glass and fancy glass for signs, doors, etc. Oil is used as fuel. The plant was formerly owned by the California Trust Company and after being in the law courts for some time, was bought by the Western States Gas and Electric Company in 1911. Capital was not available to put it on a good financial footing. The sand is brought from Monterey County and is a beach sand. The lime comes from San Francisco, soda from Pennsylvania Chemical Company, and salt cake from Point Richmond.



Stockton Window Glass Plant at Stockton, San Joaquin County, California, owned by the Western States Gas and Electric Company.

STANISLAUS COUNTY.

By F. L. LOWELL, Field Assistant.

Field work in September, 1914.

Stanislaus County, which comprises 951,000 acres of land, extends from the eastern foothills of the Coast Range on the southwest and runs across the San Joaquin Valley in a northeasterly direction to the western foothills of the Sierra Nevada mountains. Most of the land is under cultivation and very little mineral is found within its boundary. In the southwestern part of the county, beginning at Mt. Boardman in the Coast Range, some quicksilver, manganese and magnesite are found, and a little further east silica, sand and clays are found. The central portion of the county is devoted exclusively to farming, fruit raising, and stock raising, and no mineral is encountered until the northeastern part of the county is reached in the Sierra Nevada foothills. Gravel from the Stanislaus River at Oakdale is utilized for road purposes, and at Knights Ferry, on the Stanislaus River, some ochre is shipped each year. The principal mining operations in the county are at La Grange, where gold dredging is carried on with success. There are five irrigation projects in the county which give an ample supply of water for all the land not served by wells.

BUILDING MATERIALS.

Red Brick.

Craycroft Brick Yard. Owned by the Modesto Repressed Brick Company and located on a 20-acre piece of land on the outskirts of the city of Modesto. The plant was established in 1907 and consists of two boilers, brick trays, 700-barrel oil tank and residence. The clay is obtained on the ground and is worked up by horse power and molded by hand. The brick is sold from $8 to $10 per thousand and is used mostly in local building operations.

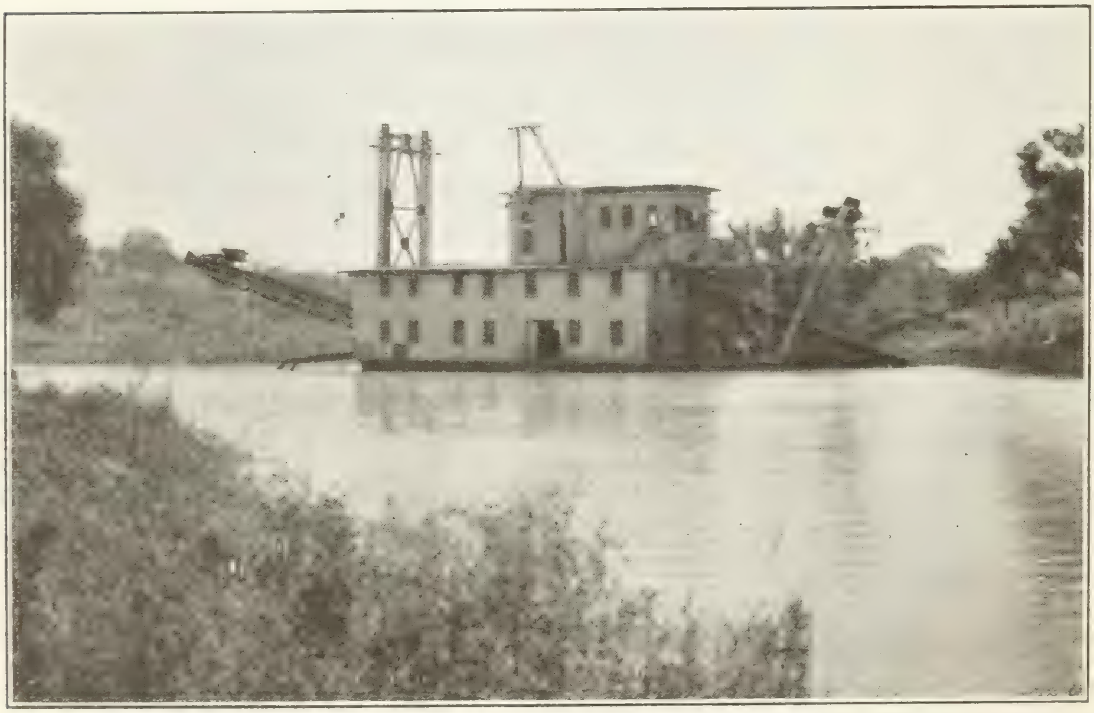
Gravel.

Brichetto Bros. Gravel Pit. This gravel pit is located in the bed of the Stanislaus River near Oakdale, in Secs. 10 and 11, T. 2 S., R. 10 E., M. D. M. The gravel ranges in size from very fine to coarse boulders and is used for road work.

Dixon Gravel Pit. Owned by Mrs. Dixon, of Oakdale, and located in the bed of the Stanislaus River. The gravel is used on the roads and for concrete work.

Dorsey Bros. Gravel Pit. Owned by E. W. and E. S. Dorsey, of Oakdale, and located in Secs. 10 and 11, T. 2 S., R. 10 E., M. D. M., near Oakdale on the Stanislaus River. There is a road to the gravel pit, and the material is sold for road work.

Craycroft brick yard at Modesto, owned by the Modesto Repressed Brick Company, of Modesto.



Gold dredge belonging to the La Grange Gold Dredging Company, at La Grange, on the Tuolumne River.

Wheeler Gravel Pit. Owned by W. F. Wheeler, of Oakdale, and located in Secs. 10 and 11, T. 2 S., R. 10 E., M. D. M., on the Calaveras River. The land is patented. The gravel is used on the roads and for concrete work. The gravel is sold at 25 cents per wagon load at the pit.

Clay.

A good clay suitable for brick is located in Secs. 20 and 21, T. 5 S., R. 7 E., M. D. M., and owned by J. J. Cummins and Thomas H. Wolf, of San Francisco. The clay is located on a 320-acre piece of patented land, about 3½ miles northeast of Patterson on the Southern Pacific Railroad. The clay contains about 60% silica, 24% alumina, 3% iron, and a little magnesia. It is not being used at present.

GOLD.

There are no gold mines in the county that are being operated at the present time. There is a gold dredge owned by the La Grange Gold Dredging Company that is operating on the Tuolumne River near La Grange.

La Grange Gold Dredging Company. Owns one dredge on the Tuolumne River, having 7 cubic feet close connected buckets, shaking screens, Holmes gold-saving tables, belt tailing conveyor and digs 32 feet below water level. It works on spuds. The company owns 200 acres of dredging ground that averages 35 feet deep. The gravel is medium coarse and the bedrock is soft. The ground was prospected by drills. (See State Mining Bureau Bulletin No. 67, ''Gold Dredging in California.'')

Alto Gold Mine. Owned by the California-Calaveras Mining Company, of 356 Pine street, San Francisco, and located in the eastern half of the Calaveras Grant in the Knights Ferry district. The Calaveras Grant consists of 7200 acres of land and is located partly in Calaveras County and partly in Stanislaus County. This mine had a vertical shaft 400 feet deep, one crosscut 400 feet long, another 200 feet long and a glory hole 600 feet long and 400 feet wide. There formerly was a 40-stamp mill and other equipment, but this has fallen to decay. This property has been in litigation since 1908 and information was very hard to obtain as the mine has not been working for some time.

MAGNESIA.

About 440 acres of land in T. 6 S., R. 6 E., have recently been taken up and about 50 acres of this 440 are located as magnesia land. Three claims are located on El Puerto Creek, about 15 miles from Patterson on the Southern Pacific Railroad.

According to analysis the ores are reported to contain 42.88% magnesia and 0.223% CaO. The ore occurs as stringers in serpentine formation. This ore has been recarbonized by exposure to the atmosphere and will require a slight calcining before use. It is soluble in hydrochloric acid and the resulting magnesium chloride is serviceable in making tile and fire brick. The property is owned by Howard A. Broughton and associates, 520 Rialto Building, San Francisco.

MANGANESE.

Manganese is now one of the most important minerals in this county that is attracting attention at the present time. It is to be found in the southwestern part of the county, in the eastern part of the Coast Range of mountains between Santa Clara County and Stanislaus County. The development work so far has not been very extensive as manganese from California has not been in very great demand until recently.

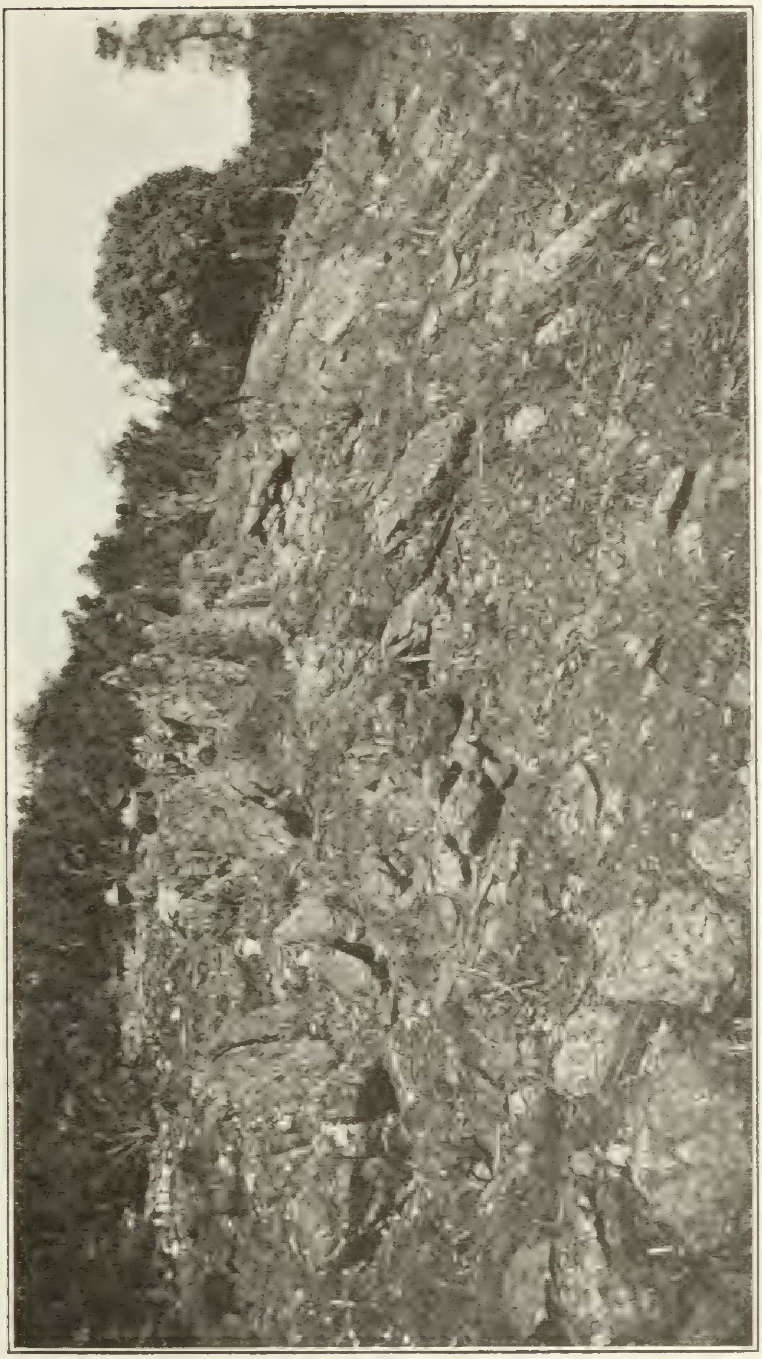
California Manganese Company Mine. Consists of five unpatented claims and 2160 acres of patented land located in Secs. 9, 11, 15, 21, 22, 27, 28, 33 and 34, T. 6 S., R. 5 E., about 35 miles from Livermore by wagon road. Most of this property is in Stanislaus County but a little is across the border and in Santa Clara County. The manganese is in lenses between sandstone and quartzite and the ores are manganite and pyrolusite. The development consists of two tunnels, one 15 feet and the other 20 feet long, and open cuts. This property is 25 miles from Patterson on the Southern Pacific Railroad and a wagon road is contemplated that will connect the mine with this shipping point. There is very little mining equipment on the property.

Manganese Prospect. This is a prospect in Sec. 8, T. 6 S., R. 6 E., M. D. M., that has a little trenching done on it. Could not get any further information about it. (See U. S. G. S., Bull. No. 427, on manganese.)

OCHRE.

Yellow ochre is mined to a limited extent and a few hundred tons are shipped to San Francisco each year.

Voyle Ochre Mine. Located in Sec. 29, T. 1 S., R. 12 E., M. D. M., at Knights Ferry on the Stanislaus River. The mine is on unpatented land. A small tunnel 50 feet long has been run into the face of the hill, but there is no equipment. About 150 tons of yellow ochre are shipped to W. P. Fuller & Company each year. It is owned by the California Ochre Mining Company, 126 Mission street, San Francisco.



Manganese croppings on the property of the California Manganese Company, California.

Voyle Ochre Mine at Knights Ferry, owned by the California Ochre Mining Company, of San Francisco.

QUICKSILVER.

Adobe Valley Quicksilver Mine. This was formerly known as the Stanislaus Quicksilver mine and is now owned by E. P. Newhall, box 354, Livermore, and located in Secs. 23 and 24, T. 5 S., R. 5 E., M. D. M., about 24 miles from Westley on the Southern Pacific Railroad. The property consists of 960 acres of patented land. The development consists of a 180-foot double-compartment vertical shaft. The ore is said to average 0.8% quicksilver. There is no equipment and the mine has been idle for some years.

Newhall Quicksilver Mine. This was formerly known as the Deer Park Quicksilver mine, two thirds of which is owned by E. P. Newhall, and located in Secs. 31, 32, T. 5 S., R. 5 E., M. D. M., about 22 miles from Patterson. The property consists of eleven claims of 220 acres, upon which a little development work has been done, but it has been idle for years.

Phœnix Quicksilver Group. This was formerly known as the Summit and Grayson mines, owned by Mrs. Emma Rose, of New York, and located in Secs. 20, 21, 22 and 29, T. 6 S., R. 5 E., M. D. M., 24 miles from Patterson. There are seven patented claims, four millsites and

160 acres of timber land and also six unpatented claims. The mine is being retimbered and opened up by the owners. The Orestimba mine, of 2300 acres of patented land, also belongs to this group (see "The Quicksilver Resources of California," issued by the State Mining Bureau; also State Mineralogist Reports X and XIII).

SILICA.

There is some comparatively pure silica in ledge formation and also silica sand in the county suitable for glass manufacture, but at present it is a considerable distance from cheap transportation.

Croppings of silica, owned by the California Silica Company, of San Francisco.

California Silica Company. Consists of 40 acres located in the SE. ¼ of Sec. 4, T. 6 S., R. 6 E., M. D. M., 12 miles up El Puerto Creek from the town of Patterson. The analysis of the silica by George James Company, gives water 0.8%, iron none, and silica 99.2%. The analysis by Smith, Emery & Company gives silica 99.783%, alumina 0.21% and iron oxide 0.007%. Only assessment work has been done. The width of the vein is 5 to 20 feet.

Silica Sand. Located on a 320-acre patented piece in Sec. 20, T. 5 S., R. 7 E., M. D. M., and owned by J. J. Cummings and Thomas Wolf, 2231 Ashby avenue, Berkeley. The sand is said to be 97% to 99% pure in silica. It is very fine grained.

WATER.

This county is considered one of the best watered counties of the State and is served by five irrigating systems, as well as numerous wells sunk by individual farmers. Perhaps as an illustration of the ample supply of water that is obtained from wells, that of the city of Oakdale might be mentioned. This well is situated in the city limits and is 217 feet deep. The first 50 feet is walled up and the remainder of the well is cased with 10-inch casing. The well supplies, by pumping, enough water for the city's consumption, both domestic, street sprinkling and a swimming pool. Approximately 327,000 gallons are pumped every twelve hours during the summer months.

PART V.

The Counties of

San Diego, Imperial

By FREDERICK J. H. MERRILL, Ph.D., Field Assistant.

December, 1914

INTRODUCTION.

The county of San Diego and its former eastern extension, now known as Imperial County, comprise a section of southern California unique in climate, mineral resources and agricultural possibilities. The first of these subjects has become familiar to the tourist and health seeker and has had an important influence in building up the city of San Diego and the population of the surrounding country. The second, to which this report is devoted, is of great interest for its variety, and will be, in the future, as it has been in the past, a matter of substantial financial importance. The agricultural conditions are so inviting that they have attracted world-wide attention and have been so attentively considered that they need not be described in detail here.

The following report presents the result of nearly three months of field work in the two counties. In this limited time it was not possible to visit every locality, but, by combining the writer's personal observations on the principal properties with other data from reliable sources, all deposits, of any importance or interest, have received attention and are accurately recorded.

In discussing the resources of these two counties, it seems advisable to treat them in two separate chapters, though their union prior to 1907 and their intimate relation in geography and geology, make it necessary to refer frequently from one to the other. Articles on the geology and mineral resources of San Diego County, together with Imperial County, are to be found in many of the publications of the State Mining Bureau, and to them the reader is referred for a large amount of historic detail. Reference to these will be found in the bibliography at the end of this report.

Acknowledgments for important assistance rendered are due to General A. W. Vogdes, Messrs. C. E. Anthony, J. G. Naylor and W. H. Trenchard, of San Diego, to Mr. Walter Nordhoff, of National City, to Mr. D. F. Lane, of Julian, and to many others.

Dr. A. S. Eakle of the University of California has made petrographic determinations of a number of rocks from the granite quarries, from the gem localities and from the Dulzura gold belt.

CHAPTER I.

SAN DIEGO COUNTY.

HISTORY.

The region of San Diego was first made known to the civilized world by the discovery of its bay in September, 1542, by Juan Rodriguez Cabrillo. By the arrival there on June 16, 1769, of Padre Junipero Serra and the establishment in honor of San Diego de Alcala of the first Franciscan Mission in California, this place was fixed as an important landmark in the settlement of the Pacific coast, and claims special prominence in the history of the Golden State.

The county bearing this name, with a present area of 4,221 square miles and a population in 1910 of 61,665, was one of the original twenty-seven counties organized in 1851 by act of the state legislature. At that time it was of much greater extent, its area having been considerably diminished, in 1889, by the separation from it of a part of what is now Riverside County. In 1907 it was still further reduced by the organization of its eastern portion as a separate county under the name of Imperial.

PHYSIOGRAPHY.

The county is diversified in its physiography, its essential topographic features being an area some 50 miles broad, of parallel ranges of granite, with southeast trend, including the southeastern continuation of the San Jacinto Range of Riverside County. Among these granite ranges are valleys occupied by parallel belts of metamorphic rock, chiefly slate and mica schist, with some quartzite and limestone, having nearly vertical dip and northwest strike, and extending, with many interruptions by granite intrusions, from Mexico into Riverside and Orange counties. About 40 miles northeast of San Diego, in a belt extending northwest and southeast, the altitude of the ranges exceeds 5,000 feet at many points, and some mountains attain greater elevations, as follows: Palomar, 6,126 feet, Hot Springs Mountain 6,400 feet, Cuyamaca 6,515 feet and Laguna Mountain 6,500 feet. These last two are intrusions of diorite or gabbro which, as the geologic map shows, occur here and there in the granite area. Southwesterly from this elevated belt the altitudes decline toward the coast. On the seaward border of the granite, extending northwest some 40 miles from the Mexican line, but only a few miles wide, is an area of volcanic felsite and tuffs, for the most part buried beneath the mesa formations, but exposed at many points and forming the mountain peaks of Otay, San Miguel, Black Mountain and others. On the west flank of all the crystalline formations, lies an extensive mesa or plain of Tertiary deposits, prominent in the landscape near San Diego and gently sloping seaward, from an altitude of about 500 feet at its eastern margin, to an elevation of about 300 feet near the coast line. Thus, between La Mesa and La Jolla, its slope is about 20 feet per mile. From the main divide the surface slopes steeply eastward toward the Salton Basin, and here desert conditions prevail, since the precipitation mostly falls on the western slope.

Many observers have commented on the fact that the slope of the granite ranges is steeper toward the east than toward the west, for they rise abruptly some thousands of feet from the comparatively level and low lying Tertiary and Quaternary formations of the Salton Basin. Some have attributed their escarpments wholly to faulting, but, on examination of the region, it seems inadvisable to adopt this as the sole explanation. West of the Salton Basin, which is evidently in a syncline, though possibly on a fault line also, is an anticlinal area including minor synclines and having for its main axis, the granite of the peninsular range which trends nearly northwest. The northeast limb of this principal anticline is much steeper than the opposite one which declines toward the ocean. The various anticlinal and synclinal folds are intersected by parallel faults at right angles to their axes and consequently with northeast trend. These faults have cut the formation into blocks which pitch northwesterly. From the relation of the crystalline rock masses on the west side of the Salton Basin to the fossiliferous Miocene Tertiary beds it is evident that a local uplift of some 2,000 feet has occurred later than the Miocene period and probably in the Postpliocene and, to this uplift, in part, some of the more noticeable escarpments owe their present altitude.

GEOLOGY.

The following synopsis of the geology of the county is a brief résumé of what is known of its structure and history, no complete geologic survey having yet been made:

Under the first geological survey of California, conducted by Dr. John B. Trask from 1851 to 1856, no work was done in San Diego County.

In November and December, 1853, Mr. Wm. P. Blake, as geologist of the expedition under Lieut. R. S. Williamson, to determine a route for a transcontinental railroad, made a careful reconnaissance of the Salton Basin, and traversed the valley of Carrizo Creek through Vallecito to San Felipe and thence to San Diego. The results of his important work are to be found in volume V of the Reports of the Exploration, issued as Senate Document No. 78 of the Thirty-third Congress, second session. Prof. Wm. P. Blake also contributed to the Report of the Superintendent of the Coast Survey for 1855, pp. 376-398, an article entitled ''Observations on the Physical Geography and Geology of the Coast of California from Bodega Bay to San Diego.''

In December, 1857, in connection with the expedition for the exploration of the Colorado River under Lieut. J. C. Ives, Dr. J. S. Newberry crossed the country from San Diego to Yuma. His observations, made in this journey, are on pages 13–18 of the report of the expedition, which is House Document No. 90, of the Thirty-sixth Congress.

Under the Second Geological Survey of the State, in 1872, W. A. Goodyear made a reconnaissance of the county, but his notes were not published until 1888. See Eighth report State Mineralogist.

In 1882 H. G. Hanks, State Mineralogist, visited the Colorado River Desert, as described in the second report.

In 1892, H. W. Fairbanks made a reconnaissance of the county over its principal highways, and his accurate observations appear in the eleventh report.

In all of the reports subsequent to the fifth are published notes on the mineral resources, and these embody geological observations.

In the limited time allotted to the writer for a study of the mineral resources of the county, he has noted all geologic details which came within his observation in visiting the chief areas of production. The sum total of all these observations, combined with facts gleaned in the study of neighboring areas, gives opportunity for a fairly accurate résumé.

It is hoped that the following review of the geology will have a stimulating effect on teachers and students within the county and in its neighborhood, and lead them to make further contributions to our knowledge of the structure of the region.

Table of Geologic Formations in Southern California.*

Period			Subdivisions	Local
	Pleistocene		San Pedro	Fernando
Cenozoic, Tertiary	Pliocene		San Diego	
	Miocene	Upper	San Pablo	
			Santa Margarita	
		Lower	Monterey	Modelo Puente
			Vaqueros	
	Oligocene		Sespe	
	Eocene		Tejon	
			Martinez	
Mesozoic	Cretaceous		Chico	
	Lower Cretaceous, Comanchean		Horsetown	
			Knoxville	
	Jurassic		Franciscan	San Luis
	Triassic			Santa Ana
Palæozoic	Carbonic and possibly older		Calaveras	Julian?

*In part after Ralph Arnold. Bulletin Am. Inst. Min. Engineers, March, 1914, p. 406.

Historical Geology.

The general geologic history of this county, so far as it can at present be read and written, is as follows:

No Palæozoic sedimentary rocks in which fossils are preserved are known within the county, but from evidence collected at various points[1] concerning the metamorphic strata of the Mother Lode region and from Carbonic fossils[2] found in the Santa Ana Mountains of Orange County, we conclude that, as early as Carbonic time, and possibly earlier, shoal water conditions existed over parts of San Diego County, leading to the formation of extensive deposits of mud and sand, derived from the erosion of some adjacent continental area. These beds possibly rested on a basement of granitic material, though we are not certain of this, and in them, at intervals, thin deposits or lenses of carbonate of lime were formed. At some time subsequent to the Jurassic period, came an epoch of mountain building, during which the rock mass underlying the sediments, above mentioned, in a molten state and under great pressure; or granite from some other source, in a state of fusion, was forced upward in parallel zones of northwesterly trend. In this movement, through the attendant heat and pressure, the overlying sediments were metamorphosed, mud deposits becoming slate and mica schists, sand beds becoming quartzites and limestone being crystallized into marble. In addition, these beds were thrown into folds, anticlinal above the granite axes and synclinal in the troughs between, in the latter, the strata being so closely compressed as to stand nearly vertical. In the lapse of subsequent time, through long erosion, the metamorphosed sediments overlying the granite, have been worn away, leaving the igneous crystalline rocks uncovered in the principal mountain ranges; while the schists, slates, quartzites and limestones have been preserved in the valleys.

Subsequent to this period of mountain building, came a prolonged subsidence of the coast, during which, on the flanks of the upland, sedimentary beds were deposited in intermittent sequence from the Cretaceous through the Tertiary. As Miocene beds are not evident on the west slope, their deposition may have been interrupted by temporary emergence of the land. In the Salton Basin, however, the Miocene is represented by extensive clay deposits, well exposed in the region of Carrizo Creek and bearing proof of their age in the very noticeable bed of Miocene oyster shells (*Ostrea vespertina,* Con.) which caps them.

At the close of Miocene time, after attaining a maximum of 1,500 feet or more on the coast and 2,000 feet or more in the Salton Basin, the subsidence in the latter was suspended while that of the coast continued into Pleistocene time. Then began a gradual emergence causing the deposits formed during the submergence to be exposed to wave action at successive levels, for the rise of the continental margin was not continuous but intermittent. In the periods of no movement or of less movement, were cut and formed the various mesas, sea terraces and shore lines, which are so conspicuous in the scenery of the coast of southern California. The unequal height of some of these terrace planes shows that the movement was not everywhere the same. The elevation of the land progressed considerably beyond its present limit, and evidence from various sources indicates that the continental margin rose 800 to 1,000 feet higher than it stands at present and since then has gradually subsided. Evidence of the latter movement is seen everywhere along the coast of San Diego County, in the drowned stream valleys, often occupied by salt marshes. Of the periods of volcanic activity little is known except that considerable material of igneous origin has been deposited.

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[1] See Mother Lode Folio, U S. Geological Survey. Also San Luis Folio, U. S. Geological Survey.

[2] H. W. Fairbanks, R. XI, p. 116. Later studies of these fossils suggest their Triassic age, and modify our views concerning the Santa Ana metamorphic strata.

Structural Geology.

The formations of San Diego County are granites and other igneous crystalline rocks of several ages, metamorphic strata of great age, possibly Carbonic or older, and sandstones, shales, conglomerates, sands, gravel and clays of Mesozoic and Tertiary age.

The granites upon which the metamorphic rocks rest and by which they are intruded, are of several types, some of which Dr. A. S. Eakle has identified and his descriptions will be found under the various quarries. These granites in turn are intruded here and there by basic rocks of the diorite and gabbro types. The latter are cut, at many points, by pegmatite dikes which also sometimes appear as intrusives in the schists and in the granites. Two areas of these basic intrusives form substantial mountain ranges, one traversing the Cuyamaca Grant from north to south, and forming three peaks, of which the southernmost, 6,515 feet high, is known as Mt. Cuyamaca. Ten miles southeast, is the diorite ridge, known as Laguna Mountain, of which the summit attains an altitude of over 6,500 feet.

On the southwest flank of the granites is a volcanic area, a few miles wide, extending northwest some 40 miles from the Mexican boundary and often erroneously called ''the porphyry dike.'' This is largely overlain by the Tertiary formations. The principal rocks exposed are felsite, quarried for crushed stone at Spring Valley and Sweetwater Dam. With these, at various points, are tufas and volcanic conglomerates. The age of these volcanics is as yet somewhat indeterminate, but the specimen from Lo Tengo oil well, of black shale cut by felsite, suggests a post-Jurassic age for the latter. Dr. A. S. Eakle has made a petrographic examination of the felsite from Spring Valley and Sweetwater, and his results are as follows:

Sweetwater quarry. Metarhyolite or felsite. A thin section shows a feldspathic polarizing base filled with needles of feldspar, showing flow structure and pale green chloritic matter filling the interstices. Patches of yellow granular epidote, as an alteration product, are frequent. A grayish opaque dust is sprinkled throughout.

Spring Valley. Felsite. A thin section shows a fine indeterminate feldspathic base of needles with considerable green chlorite and altered opaque material.

The felsites may belong to the same period of eruption as the volcanics of Coyote Mountain in Imperial County, which underlie the Miocene clays, but they are of different type, for the Coyote Mountain effusive rocks are basic and, though they are badly decayed and difficult to identify, were probably mostly andesites.

The latest of the volcanics are probably the lava flows capping Tertiary gravels, seen in this county near Jacumba, and reported by H. W. Fairbanks[1] as occurring on the Santa Rosa Grant in Riverside County. They also occur near the coast south of the Mexican boundary. With these flows are deposits of tufa and conglomerate.

The metamorphic formations are mica schists, slates, quartzites and limestone, the first being especially well exposed near Julian and the latter occurring in small areas at several points. These metamorphic rocks, from their structural position and lithologic characters, may be regarded as probably equivalent to the Calaveras group, described in the Mother Lode Folio of the U. S. Geological Survey and will here be designated as the Julian group. Their exact age is uncertain.

A specimen of the Julian schist has been determined by Dr. Eakle as muscovite-schist. A thin section shows much quartz and slender frayed rods of muscovite. Much magnetite in grains and irregular masses, considerable limonite stains and an occasional apatite prism are seen.

The oldest unaltered sedimentary rock in the county appears to be a black slate which has been encountered in the Balboa, Lo Tengo and Otay oil wells and is exposed on the north slope of Mount San Miguel, on the west margin of the granite. A similar rock is found south of Dulzura in section 22. Here it contains a deposit of jasper. Lithologically it is similar to the material of the San Luis formation which has been identified in San Luis Obispo County as Franciscan or Jurassic (*see* San Luis Folio, U. S. Geological Survey). A fragment from the Otay well contained a small *Avicula*. Small outcrops of limestone are reported further northwest.

The Cretaceous strata exposed in this region are of the Chico series and appear in the bluffs on Point Loma and at La Jolla as described by Fairbanks.[2] Near the reservoir above La Jolla a specimen of *Inoceramus whitneyi* was found, which is now in the Chamber of Commerce Museum at San Diego.

As to the Tertiary, while the fossiliferous beds in and near San Diego are chiefly Pliocene, Eocene fossils have been found in Rose Canyon, and, according to Fairbanks,[2] on Point Loma. Miocene deposits have not yet been identified west of the divide, but are well developed in the Salton Basin.

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[1] Report XI, p. 101 *et seq.*

[2] Report XI, p. 95.

The Pliocene and Pleistocene formations, in stratigraphy and palæontology, have been fully described by Ralph Arnold.[3] To the average observer their chief physical character is manifest in their uniform surfaces which are known as *mesas* and therefore these merit the following description.

Mesa Formations.

As mentioned under Physiography, a prominent feature of the coastal region of the county, especially in the southwest, is the Mesa, a broad, elevated plain, gently sloping and deeply cut by stream valleys. To the layman this mesa is chiefly apparent by its relatively even surface with, here and there, a slight hummock or elevation, rising above its plane.

The Mesa and Mission Valley, Looking Northeast. F.J.H.M. Photo.

The geologist, however, also considers its materials as exposed in the banks of ravines and canyons and in cuts made in building roads. The superficial material, exposed from La Mesa westward along the side of Mission Valley and its tributaries, is seen to be chiefly a loosely cemented conglomerate 6 to 10 feet thick, underlain by finer materials of a sandy or clayey character.

On more careful investigation, the Mesa formations are resolved into two divisions: (1) An older mesa, much dissected by erosion, and largely washed away, the remnants of which, at the mouth of El Cajon Valley, reach a height of about 650 feet, and much greater altitude farther northwest; (2) A younger and less eroded mesa, of lower altitude, reaching in the same vicinity, a height of about 475 feet. The latter is the principal feature of the landscape within 10 miles of the coast in the neighborhood of San Diego.

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[2] Report XI, p. 95.

[3] Palæontology and Stratigraphy of the Marine Pliocene and Pleistocene of San Pedro, Cal. Mem. Cal. Acad. of Sc. Vol. III, 1903. Tertiary and Quaternary Pectens of California, U. S. Geol. Survey, Professional Paper No. 47, 1906.

These mesas are remnants of waved-formed terrace plains, developed at such successive intervals in Tertiary time. The upper is probably Pliocene, while the lower may have been formed in the Pleistocene. The shore line of the latter is mainly carved on the deposits of the older mesa, though in places, it rests on the crystalline rocks which underline them both. The shoreline of the older mesa is quite irregular, extending into the reentrant of El Cajon Valley and into those of Escondido, San Bernardo and others. Its level is marked by patches of loose material and conglomerate on the valley sides and on the hills within the valley, their uniformity of level and material, denoting their common origin. As stated, near Grossmont, the height of a fragment of the older mesa is about 650 feet. On the road to Poway a similar formation exceeds 1,000 feet. In the Escondido Valley it reaches 1,200 feet, and near the north line of the county it is still higher.

The Mesa and Mission Valley, Looking Northwest. F.J.H.M. Photo.

The elevation of the land or change of sea level, which raised the older mesa above the waves was much greater toward the northwest. At the national boundary the two mesas approximately coincide in level at about 500 feet above tide. On the other hand the younger or principal mesa seems to have its greatest elevation to the south. The Otay mesa has a surface height of 500 feet, while south of the Mexican boundary, the corresponding plain is higher.[4] Northwesterly its height declines until, near Oceanside, the principal mesa level seems to be about 300 feet.*

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[4] W. A. Goodyear, R. VIII, p. 518.

*For other observations see A. C. Lawson, Postpliocene Diastrophism of the Coast of So. Cal., Bull. Dept. Geol. Univ. of Cal., Dec. 1893.

GEOLOGIC MAPS.

The map prepared in 1893 by H. W. Fairbanks, to accompany his report on the geology of San Diego and Riverside counties, published in the eleventh report of the State Mineralogist, is very accurate in its general expression of structure. The Geologic Map of North America, issued in 1912 by the U. S. Geological Survey, while in general correct, shows a subdivision of the Tertiary formations of the costal area of this county, which will not be attempted here since, in this region, the mapping of Tertiary boundaries is not at present possible.

TOPOGRAPHIC MAPS.

The topographic work of the U. S. Geological Survey has been carried over the larger part of San Diego County, extending from the coast line east to the meridian of 116° 30′ west longitude, which nearly coincides with the line between ranges 4 and 5 east of the San Bernardino meridian. The sheets or quadrangles covering this area are San Luis Rey, Ramona and Cuyamaca on the scale of 1 ÷ 125,000 or about ½ mile = 1 inch, and San Diego and La Jolla on the scale of 1 ÷ 62,500 or nearly 1 mile = 1 inch. Also, within the San Luis Rey quadrangle, are two on the larger scale known as the Oceanside and Escondido quadrangles, and within the Cuyamaca quadrangle, is one on the larger scale, known as El Cajon. Beyond these, the Indio Special Map, scale 1 ÷ 125,000, covers townships 9 and 10 south in ranges 5, 6, 7 and 8 east, San Bernardino meridian. Further, all the region west of longitude 116° 30′, or range 5 east, is shown on a map known as Southern California Sheet No. 2, on the scale of 1 ÷ 250,000, or nearly 1 mile = ¼ inch. A map of the whole county on the scale 1 ÷ 125,000 has been carefully compiled under the direction of the county surveyor, Mr. James Butler, and several other county maps are for sale by local dealers in San Diego, which have been mainly compiled from the sources above mentioned.

In compiling bases for the economic map, accompanying this report, the writer has used the work of the U. S. Geological Survey as far as it extended, and has followed the map of Mr. Butler for the eastern section. The detail of Imperial County has been largely taken from the Imperial County map prepared under the direction of Mr. C. N. Perry, county surveyor, and some topographic detail has been taken from the U. S. Geological Survey Sheet, known as A Reconnaissance Map of the Salton Sink. The township plats in the U. S. Land Office at Los Angeles have also been consulted.

The purpose of the map, accompanying this report, which is on the scale of 4 miles to 1 inch, is to show the configuration of the surface and the drainage, the lines of transportation by water, by steam railway or by motor truck and wagon and, more particularly, the exact location of all mineral deposits of economic interest, whether at present being worked or lying idle.

MINERAL RESOURCES.

GENERAL.

The following pages give a concise summary of the mineral resources of the county, based on all accurate information previously on record and supplemented by additional detail obtained by the writer in his survey of the principal mineral areas. Since the time available for field work was limited, the detailed study of some specially important deposits has necessarily been left to future investigation. At the present time, the mineral production of this county is more important in non-metallic minerals than in metals. This is due, both to the decline of gold mining and to the growth of the city of San Diego and neighboring settlements, which has led to the discovery and development of extensive deposits of materials used in construction and in the industrial arts. To a large extent, the mineral resources of this county are dormant, through lack of transportation.

THE METALS.

Though, at present, they are less important commercially, it seems advisable to discuss first the metallic minerals known in the county, beginning with that precious metal, of which the discovery in California, led so early to the development of our Pacific coast. Deposits of several other metals have long been known in the county, but have not been described in the annual and biennial reports. The discussion of the metals will be given in the following order:

1. Gold
2. Copper
3. Silver
4. Lead
5. Zinc
6. Iron
7. Manganese
8. Molybdenum
9. Antimony
10. Bismuth
11. Tin
12. Nickel
13. Tungsten

GOLD.

This precious metal is found at many points in San Diego County and has, unquestionably, been known since a very early period of occupation; but its deposits, while in many cases, richly productive, at the time of their discovery, have not been continuously operated. The gold production of this county, though in the past amounting to several millions of dollars, is at present entirely suspended. Further, the present depression in all branches of the mining industry and the difficulty of finding capital for the development of small mines, has discouraged prospectors and but little new work is being attempted.

On some old unpatented claims, assessment work is still being done, some patented properties are being explored, in a limited way, and a few new claims are being developed. Near Julian, by individual effort, a small amount of ore is being produced. Since many properties appear quite limited in the extent of their ore deposits, it is not probable that many large mines will be found in this county, or be developed in the future; yet, several properties would well justify systematic exploration under expert supervision. It should be appreciated, also, that some mines have been and may continue to be, in the future, satisfactorily profitable under economical management at the hands of their owners, which might not be sufficiently productive to bear the heavier expense of operation by a corporation.

For previous records of gold mining in this county and in Imperial, see the following publications of the State Mining Bureau:

Report VI, Pt. 1, 1886, pp. 80–90;
Report VIII, 1889, pp. 512–516;
Report IX, 1889, pp. 139–154;
Report X, 1890, pp. 540–544;
Report XI, 1892, pp. 376–387;
Report XII. 1896, pp. 237–243;
Report XIII. 1896, pp. 331–341;
Register of Mines and Minerals, San Diego County, 1902.

Also, see Mineral Resources of the U. S.; U. S. Geological Survey. For records prior to 1886, see reports of R. W. Raymond, U. S. Commissioner of Mining Statistics, 1871–1885.

GOLD DISTRICTS.

The principal gold belt, lying in ranges 2, 3, 4 and 5 east, extends southward through a distance of 45 miles, from the Rice or Montezuma district, east of Warner's, to the Mexican boundary. The focus of mineralization appears to have been near Julian and Banner. In the Cuyamaca Grant are several prospects besides the historic and once richly productive Stonewall mine. At Deer Park, Pine Valley and Descanso are a number of gold mining claims, as well as west of the Cuyamaca Grant on Boulder Creek. Nearer the coast, in the vicinity of Escondido, are several prospects and two mines which have been productive. In the south considerable development work has been done near Dulzura and small prospects have been opened near Tecate, Campo and Jacumba. The chief placer in the county is in the Ballena Valley, east of Ramona, and, though not known to have been worked extensively, it is said to have been proven throughout a distance of some 8 miles. Small placers have been worked at many other places, since many gulches have yielded placer gold in the vicinity of gold bearing veins and, also, in areas where no substantial veins have been found.

The districts will be discussed in the following geographic order:

Northern Border.
Montezuma or Rice.
Grapevine.
Mesa Grande.
Escondido.
Ballena.
Julian.
Granite Mountain.
Oriflamme.
Stonewall.
Boulder Creek.
Deer Park.
Pine Valley.
Descanso.
Dulzura.
Mexican Border.

These districts are all shown on the Economic Map and the individual claims at Julian are shown on the map of that district.

THE NORTHERN BORDER.

Gold has been found in small quantities along the Riverside County boundary at many points. Most of the discoveries are placer deposits and have been chiefly of interest to Indians who have worked, in a small way, in the rainy season. Two of the more important localities are near Fall Brook and near the Temecula or Pechunga Indian Reservation.

MONTEZUMA, OR RICE DISTRICT.

This district, opened about 1896, is about 12 miles north of Banner and 6 miles easterly from Warner's on the slope of San Ysidro Mountain. In the thirteenth report, page 334, it was incorrectly described as east of Banner. The formations are metamorphic, consisting of mica schist, gneiss, quartzite and limestone, and are adjacent to a large granite area. The veins strike north 65° east and dip 70° northwesterly, and are in well-defined fissures, which cut the rocks both in strike and dip. The principal properties are controlled and operated by the Montezuma Gold Mining Company, 506 Timken Bldg., San Diego; H. W. Preston, president and general manager; F. W. Nash, secretary.

Most of the old Rice properties mentioned in R. XIII, pp. 332–345, have been relocated under new names, and several new claims have been added. At present the group comprises: Lost Mine, Granite, Combination, Sunset, Storm, Gold Bar, Virginia, Alta Vista, Eureka, Morning Star, Silver Moon, Red Chief and Bummer. The principal workings and camp are on Eureka and Morning Star.

This company has been carrying on development for about three years and had equipped the property with a mill which was burned in September, 1913. Work has been carried to a depth of 230 feet and aggregates 2,000 feet.

H. Galbraith of Warner's Springs controls the Buckeye group in the same vicinity, consisting of the following claims: Joker, on the Montezuma Vein, Warrior's Mark, Buckeye, Hillside Extension, North Star, East Star, and A. Y. Also the Maid of Erin group, comprising four claims 1, 2, 3 and 4; two on Lost Boy ledge and two on Swastika ledge. Frank Burton of Ramona owns the Swastika claim.

GRAPEVINE DISTRICT.

This camp is about 5 miles southeast of the Rice District and 16 miles from Warner's Springs. The principal property was formerly known as the Dewey Mine, and was opened about 1903. It was equipped with a mill which was never used. At present the chief claim is known as the Ready Relief and controlled by the Colorado Mining and Milling Company—J. A. Heath, San Diego, president, and Fred Wilson, San Diego, secretary. Fred Blethen of Warner's Springs is superintendent. Development work consists of a 100-foot shaft and a cross cut. A tunnel 975 feet cuts the vein at 200 feet. Two other tunnels are 75 feet and 30 feet, respectively. The vein is stated to be from 4 to 8 feet wide. At present only assessment work is being done.

MESA GRANDE.

This small district was at one time, quite productive, but has been idle for nearly twenty years. It is 65 miles northeast of San Diego and 15 miles northwest of Julian, in the same zone of mica schist. The principal claims are as follows:

Black Eagle. R. XI, p. 382; XII, p. 238. One mile northeast of the Rancheria, 20-foot shaft and some superficial workings. When first discovered the quartz was rich in gold. Owner, Ed. Hinkle, San Diego.

Shenandoah. R. XI, p. 382; XII, p. 242. One and a half miles northeast of the Rancheria. Elevation 3,200 feet. Shaft 175 feet. Steam hoist and 5-stamp mill. Owner, San Diego Business College, San Diego.

Gold Cliff. Has only superficial work.

Red Hill and *Hillside* are other claims long idle. The first is owned by Martin Steenbock and Vance Angel, Mesa Grande.

Wild Cat is a claim owned by Fred Scholder, Mesa Grande.

ESCONDIDO.

In the vicinity of this city, many gold prospects have been opened in the past, and some twenty years ago considerable activity was displayed. But, out of many properties, only two, the Escondido and the Oro Fino, became producing mines and at present all are idle.

It appears that about 1895 there was much prospecting done in this region, and the industry of many prospectors led to the opening of cuts, tunnels and shafts in a score of places. Some eighteen properties were opened but many of them were soon abandoned and some of them are unknown. The Register of Mines and Minerals for San Diego County, issued in 1902, mentions only the Oro Fino; but the Escondido also was probably then in operation. According to the record, thirteenth report, pages 331-347, exploration work in this vicinity was done in five areas, and the claims formerly located may be arranged geographically in the following groups:

I. North, 4 miles. White Oak, La Condado. *Abandoned.*
II. Northeast, 3 to 6 miles. Moe, Monarch, Geneva, Bottle Peak. *Abandoned.*
III. East, 3 to 4 miles. Bloodstone. *Abandoned.*
IV. Southeast, about 2 miles. Escondido, Oro Fino, Cravath. *The only productive area.*
V. Southwest and west in a zone extending from 3 to 9 miles. A number of prospects, showing both gold and copper.

Details of the abandoned claims are to be found in the thirteenth report, pages 331-346. Concerning the others, some additional facts are herewith given.

Group IV. Cleveland-Pacific Mining Co.

Escondido Mine. R. VIII, 524; XI, 382; XII, 240; XIII, 336. Two miles southeast of the city in Lots 2 and 4 of Block 257, and Lot 4 of Block 188. This mine is on the Rincon del Diablo Grant, purchased in 1884, by the Escondido Town and Land Company. From an early period of American occupation it was known as an *antigua,* that is, a property operated by early Spaniards or Mexicans, as evidenced by ancient workings.

About 1868 it was worked by Americans with an arrastre. After several changes in ownership, it was taken up in 1897 by the Cleveland-Pacific Mining Company, which operated for several years, and it has been on record as a producer, Mineral Resources of the U. S.; U. S. Geological Survey, 1907–09; but since 1911 it has been shut down. The corporation is represented by W. F. Speith, manager, 9283 Hough Court, Cleveland, Ohio.

Head Frame. Cleveland-Pacific Mine, Escondido. F.J.H.M. Photo.

The country rock is diorite and the ore is quartz; the vein varying from a few inches to 3 feet in width. Its strike is about north 40° east and the dip about 50° westerly. The deepest workings have a depth of 270 feet. Drifts on the vein amount to about 500 feet.

The equipment consists of two steam hoists and a mill of 5 stamps, with plates for amalgamation, a Wilfley table and two 10-foot cyanide tanks.

Dr. A. S. Eakle determines the wall rock here as granodiorite. A thin section shows much plagioclase, a little orthoclase and quartz, large plates of green hornblende, a few needles or prisms of apatite, and a little magnetite.

Oro Fino. R. XII, 242; XIII, 343. Two miles southeast, Lots 5 and 7 of Block 188.

This mine is about one quarter mile northeast of the preceding, in the same diorite and apparently on a parallel vein lying a little to the west. It has a mill of 5 stamps. It was operated for some years and has been a small producer, but since 1905 it has been idle. Owner, Mrs. O. J. Stough, San Diego. Depth of shaft, 330 feet. Drifts on the vein about 1,000 feet.

Cravath. R. VIII, 524; XI, 382; XII, 239; XIII, 334. Two miles southeast, Lot 2 in Block 321.

This property is about 200 yards northeast of the preceding, and is in the diorite, apparently on the Escondido fissure, the dip and strike of the vein being about the same.

The depth of the shaft is 100 feet. Only a short drift has been carried along the vein. But little work has been done and no production has yet been attained. No mill.

Owned in partnership by H. T. Robertson, $\frac{2}{3}$, and Louis Cassou, $\frac{1}{3}$, both of Escondido.

Group V.

The region west and southwest of Escondido lying between San Dieguito River and San Marcos Creek, throughout a range of hills in which are Mt. Whitney and Cerro de los Pozos, has been extensively prospected and many claims have been located. Most of these have a showing of copper in their outcrop.

Able. Seven miles southwest. R. XIII, p. 331. *Abandoned.*

Clifton. Nine miles southwest. R. XIII, p. 334. *Abandoned.*

Mountain Lion. Six miles southwest. R. XIII, p. 341. *Abandoned.*

Jolly Boy. R. XIII, p. 340. This lies in section 7, township 13 south, range 2 west, together with the claims known as B. S., *Oxide, Mars, Cora B.* and *Sunnyside.* The owners are A. W. Pray, H. H. Case, D. Crise and Cora B. Hall, all of Escondido, who have pooled their interests and hold the claims as a group. But little work has yet been done on them.

Coyote. R. XIII, p. 334. This was a group of four claims, first located in 1896, subsequently abandoned and relocated in 1913, by Peter Schnack of Escondido, under the names *Redrock; R. Extension No. 1; R. Extension No. 2, and R. Extension No. 3.* They lie in section 1, township 13 south, range 3 west, extending diagonally across the section from southeast to northwest. The ore body is in diorite and is said to be about 10 feet wide on the outcrop. It is opened by an incline 225 feet deep.

BALLENA PLACER.

This deposit of auriferous gravel, lying southeast and east of Ramona and first described by H. W. Fairbanks (R. XI, p. 91), is an old river bed with southwesterly trend, belonging to a system of drainage now extinct and possibly of Tertiary age. The gold may have come from the region about Julian. While these gravels have yielded values through a distance of 6 to 8 miles, one of the best areas comprises parts of sections 17, 18, 19, 20 and 21 of T. 13 S., R. 2 E. This ground is now controlled by C. F. Willard, of Ramona. Pay gravel also occurs in the adjoining School Section No. 16. The deposit probably extends south into the San Vicente Grant.

The history and production of this placer are obscure. From the earliest times Mexicans and Indians have worked this ground during the rainy season, when water was available, and there is no doubt that the production has been substantial.

As often happens, some parts of this placer are quite rich and values of $1.50 or more per yard have been reported. While those interested have investigated this deposit with very satisfactory results, there has, however, been no systematic sampling to determine the average value of any substantial area. To accomplish this, it would be necessary to survey the ground, divide it up into squares of convenient size, sink holes or pits at regular intervals and carefully sample the gravel from each opening.

At present such work is not within the scope of the State Mining Bureau, so that little can be said, based on official information. It was long supposed that, as this gravel lay above the present drainage lines, it would be necessary to bring in water from some higher level to wash the gravel. Accordingly a plan was undertaken some years ago to divert some water from the Santa Ysabel Valley and bring it to the Ballena placer through a long ditch. This enterprise was terminated by an injunction obtained by ranchers in the San Pasqual Valley.

Mr. C. F. Willard, who has long been interested in this ground, claims that his investigations establish the fact of an underflow of water in the gravel sufficient to float a dredge.

It seems to be established that a very substantial thickness of gravel exists here, claimed to average 30 feet, with no barren overburden, and it is stated by the owner that values will average 30 cents per yard without reckoning the richer streaks and channels. Undoubtedly in the near future, when industrial conditions improve, this placer will attract the attention of substantial capital and receive the expert examination it deserves.

JULIAN.

This district, which includes Banner, is 55 miles northeast of San Diego, by county highway, and about 35 miles from the railway at Foster.

History.

Gold has been known here since a very early period, and placers were worked in neighboring gulches for some years before the precious metal was found in veins. The first vein discovery is said to have been made late in 1869 on what was afterward the Van Wert claim. On February 22, 1870, another vein was discovered and a claim located on it under the name of Washington. From 1870 to 1880 there was great activity in this district and the production of gold is estimated at over $2,500,000.00.

The conditions in the camp during its Bonanza days, are more a matter of tradition than of history. The State Mining Bureau had not yet been organized and there was no public officer charged with the duty of making a careful record of existing conditions. At that time, however, Dr. R. W. Raymond was acting for the Federal Government as U. S. Commissioner of Mining Statistics, and many details of the discoveries and operations at Julian will be found in his annual reports beginning with the third, dated 1871, and running through the next succeeding volumes. These reports were issued as Executive Documents of Congress, and are to be found in most public libraries. In behalf of the State Mining Bureau, Mr. H. G. Hanks, State Mineralogist, visited Julian in 1886, Mr. W. A. Goodyear reported briefly on it in 1888 and 1889, and Mr. E. B. Preston was there in 1890. In 1892, 1894 and 1896 Mr. W. H. Storms visited the camp and recorded all facts available concerning the properties and their equipment. In 1902 Mr. E. Hubon reported on the details of the properties for the Register of Mines and Minerals. Some statistics of production in this camp will be found in the volumes on Mineral Resources of the United States issued by the U. S. Geological Survey. At the outset of the early operations a substantial zone of secondary enrichment was found, close to the surface, and much rich ore was taken out, some of it having been sold to jewelers for manufacturing purposes. In the course of time these veins were worked down to water level, the free milling ore became exhausted, and, with the appearance of sulphide ores, the values became reduced, and, the metallurgy more difficult, especially as in some mines the ore contains arsenic. Moreover, as the mines grew deeper, those not opened by tunnel were obliged to add, to the cost of mining, the expense of pumping water, for this district has a rainfall of over 30 inches per year.

At present the camp is very quiet, though many owners are keeping up assessment work in hope that financial conditions may change and that mining properties may again become saleable. Many properties are now inaccessible owing to water in the workings, or to caves, so that little can be seen and little added to what has already been published in the reports of this Bureau, to which the reader is referred for many details which can not now be secured. The principal references are as follows: R. VI, Pt. 1, pp. 85–87; R. VIII, pp. 513–519; R. IX, pp. 143–147; R. X, pp. 541–544; R. XI, pp. 376–381; R. XII, pp. 237–243; R. XIII, pp. 331–347; Register of Mines and Minerals, San Diego County, 1902.

Geology.

The geology of this district is comparatively simple. The country rock, nearly everywhere, is a metamorphic slate or mica schist, with northwesterly strike and nearly vertical dip, which has been already described and provisionally assigned to the Calaveras group. Here and there, it contains small beds of quartzite which have been used in building house foundations. At some points, it has been injected with granitic matter in thin sheets parallel to the foliation of the schist. When this occurs, a rock results which closely resembles a granite gneiss. Small intrusive areas of granite also appear.

The mineralization of this area is in fissure veins of quartz which, both in dip and strike, are generally parallel to the schistosity of the country rock. These veins are essentially ''stringer leads'' and are usually small in width, following the curving strike of the schists as they swing westward toward Julian. Several parallel veins have been recognized, four of which have been regarded as continuous for several miles. The easternmost was known as the Chariot vein, those succeeding to the westward being known as the Ready Relief, the Cable and the Ruby, from names of claims located on them. (See map.)

In geologic structure, we have at Julian a miniature ''mother lode,'' and much valuable detail bearing on the geology of the veins there and the conditions under which they were formed will be found in various reports on the Mother Lode and particularly in the Mother Lode Folio of the U. S. Geological Survey.

On account of the extent of this district and in view of the probability that some of the claims will be reopened, it has seemed advisable to give a careful record of the ownership of the properties and their relative positions. Accordingly the following cross-referenced lists have been made of the claims and their owners and a map has been prepared showing the relative positions of the claims now in existence. Careful attention has been given to the preparation of the lists of claims and owners, for many claims have been sold, many have lapsed and been relocated, and a considerable number have been abandoned and forgotten. The map has been compiled by enlarging the topographical detail of a portion of the Ramona quadrangle of the U. S. Geological Survey, and adding the boundaries of the existing claims as shown on a map of the Julian District, made in 1891 by D. D. Bailey, J. Chamberlain, and W. A. Sickler. The topography is correct, as well as the relative positions of the claims. As to their exact dimensions, there may be some inaccuracies, on account of the many relocations which have occurred, but the map should be of much general value. It is inserted in the margin of the general map of San Diego and Imperial counties.

Shaft House and Dump. Owen's mine, Julian.

List of Mining Claims in Julian District.

Name of property	Map No.	Owner	Address
Aguajita*	125	Smoky City Gold Mining and Milling Company	Pittsburg, Pa.
Alpha*		Mrs. Rosie Jacoby	Los Angeles.
Antelope	96	D. D. Bailey	Julian.
Bedrock	95	Chas. Bacon	Julian.
Belmont	121	D. D. Bailey	Julian.
Blue Jay*	73	John McCain	Julian.
Cable	111	Venturina Mining and Milling Company	San Diego.
California	82	E. F. Bowen	Julian.
Carp	114	D. D. Bailey	Julian.
Chapparal	92	H. A. Landwehr	Los Angeles.
Chariot North	127	F. McN. Hamilton	San Francisco.
Cheerful Moments	99	Oro Blanco Mining Company	San Diego.
Chieftain	71	Martin Jacobs	Julian.
Cincinnati Belle	105	Oro Blanco Mining Company	San Diego.
Contact	101	E. F. Bowen	Julian.
Eagle	75	A. P. Frary	Julian.
El Dorado	91	E. F. Bowen	Julian.
Elevada*	124	Smoky City Gold Mining and Milling Company	Pittsburg, Pa.
Ella	81	E. F. Bowen	Julian.
Empire	102	R. Melrose	Julian.
Fountain	113	D. D. Bailey	Julian.
Fraction	107	Venturina Mining and Milling Company	San Diego.
Friday*†		Friday Copper Mining Company	San Diego.
Gardiner	87	Lincoln University	Lincoln, Neb.
Golden Chariot	128	Chariot Mill and Mining Company	San Francisco.
Golden Gem I	89	D. F. Lane	Julian.
Golden Gem II	88	D. F. Lane	Julian.
Golden Shamrock	93	H. A. Landwehr	Los Angeles.
Gold Drops, formerly Bloomfield	100	E. F. Bowen	Julian.
Gold King*	129	D. C. Collier & Co.	San Diego.
Gold Monster	112	D. D. Bailey	Julian.
Gold Queen*	130	D. C. Collier & Co.	San Julian.
Grand Central	84	L. A. Smith	Julian.
Hassayhampa	86	J. E. McGowan	Julian.
Helvetia*	85	H. A. Landwehr	Los Angeles.
Hidden Treasure	103	D. D. Bailey	Julian.
High Peak	76	H. A. Landwehr	Los Angeles.
High Peak, South	76a	H. A. Landwehr	Los Angeles.
Homestake	109	R. Melrose	Julian.
Howard	119	D. D. Bailey	Julian.
Hubbard North	120	G. W. Hazzard	San Diego.
Hubbard South	122	D. D. Bailey	Julian.
Ivanhoe	78	H. A. Landwehr	Los Angeles.
Janet, Owens W. Extension	68	H. A. Williams	Julian.
Kentuck S.	104	Oro Blanco Mining Company	San Diego.
Madden	98	Chas. Bacon	Julian.
Nip and Tuck	83	E. F. Bowen	Julian.
North Star		Robert Melrose	Julian.
Owens New*	72	H. A. Williams	Julian.
Owens Old*		H. A. Williams	Julian.
Padlock	97	F. Harriett Estate	Julian.
Point Loma	123	Chalmer Bailey	Julian.
Poor Man		Chalmer Bailey	Julian.
Pride of the West*		Rex B. Clark	San Diego.
Raindrop	115	D. D. Bailey	Julian.
Ranchita*	126	C. J. Couts	Vista.
Ready Relief*	117	D. D. Bailey	Julian.

*Patented.
†Copper and nickel.

List of Mining Claims in Julian District—Continued.

Name of property	Map No.	Owner	Address
Redman	110	D. D. Bailey	Julian.
Redman North	108	D. D. Bailey	Julian.
Richmond	90	D. C. Collier & Co.	San Diego.
Roosevelt	70	H. A. Landwehr	Los Angeles.
Rossland	77	H. A. Landwehr	Los Angeles.
Ruby	106	F. Harriett Estate	San Diego.
San Diego	80	H. A. Williams and W. R. Malone	Julian.
Stanley	118	R. Melrose	Julian.
Tom Paine	116	D. D. Bailey	Julian.
Tom Scott	69	Geo. R. Sawday	Witch Creek.
Townsite	79	H. A. Williams	Julian.
Warlock	94b	H. A. Landwehr	Los Angeles.
Warlock No. 2	94a	H. A. Landwehr	Los Angeles.
Warlock No. 3	94	H. A. Landwehr	Los Angeles.
Washington	74	F. Harriett Estate	San Diego.
Van Wert*	67	John McCain	Julian.

*Patented.

List of Julian mining claims arranged by owners. Data of development taken from publications of State Mining Bureau:

CHAS. BACON, Julian.

Bedrock.

Madden. R. VI, Pt. 1, p. 86; XII, p. 242; XIII, p. 341. Two veins, 1 foot. Strike NW. Dip SW. Shaft 200 feet. Tunnel 50 feet. Drifts 500 feet. Depth 125 feet.

CHALMER BAILEY, Julian.

Point Loma.

Poorman.

D. D. BAILEY, Julian.

Antelope. R. XI, p. 380; XII, p. 238; XIII, p. 331. Elevation 3,500 feet; 1 vein, 1½ feet. Strike NW. Dip SW. Tunnel 200 feet. Shaft 100 feet. Drifts 300 feet. Depth 150 feet.

Belmont.

Carp.

Fountain.

Gold Monster.

Hidden Treasure. R. XIII, p. 339; elevation 3,200 feet; 1 vein, 1½ feet. Strike NW. Dip SW. Tunnel 600 feet. Incline 60 feet. Drift 400 feet. Depth 175 feet. Extensive workings above the tunnel level.

Howard.

South Hubbard. R. VI, Pt. 1, p. 87; XI, p. 380; XIII, p. 345. Elevation, 3,000 feet; 1 vein, 12 inches wide. Strike NW. Dip 45° NE. Cross cut tunnel, 300 feet; strikes vein 200 feet below surface. Drifts 90 feet SW., 400 feet NW. A shaft connects adit level with surface. Depth, 275 feet.

Raindrop.

Ready Relief.[1] R. VI, Pt. 1, p. 87; VIII, p. 513; IX, p. 147; X, p. 543; XI, p. 378; XI, p. 378; XIII, p. 344. Elevation, 2,900 feet; 1 vein, 3 feet. Strike NW. Dip NE. This is the northward continuation of the South Hubbard vein. Shaft 200 feet. Incline 100 feet. Tunnel, 2,000 feet. Depth, 250 feet. Worked through 3 adits. Has 10 stamps. Water power mill.

Redman. R. VI, Pt. 1, p. 87; XI, p. 380; XIII, p. 344. Elevation 2,800 feet; 1 vein, 2 feet. Strike NW. Dip SW. North extension of Ready Relief. Vertical shaft 113 feet. Tunnel on vein 120 feet, cutting shaft 25 feet below surface. Total tunnel, 250 feet. Drifts, 300 feet. Depth, 150 feet.

North Redman.

Tom Paine.

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[1] Patented.

E. F. BOWEN, Julian.

California. One vein, 6 inches. Strike NW. Dip SW. Shaft, 40 feet. Drifts, 30 feet.

Contact.

Ella. R. VI, Pt. 1, p. 85; XII, p. 239; XIII, p. 335. Elevation, 3,500 feet.

El Dorado. One vein, 6 inches, Strike NW. Dip SW. Open cut, 30 feet. Tunnel, 40 feet. Drift, 150 feet. Depth, 100 feet.

Gold Drops. Formerly Bloomfield.

Nip and Tuck. Formerly Lucky Ben.

CHARIOT MILL AND MINING CO., 555 Mills Bldg., San Francisco. Adelaide Elliot, president; J. H. Isham, secretary.

Golden Chariot.[1] R. VI, Pt. 1, p. 86; IX, p. 147; XIII, p. 337.

R. B. CLARK, San Diego.

Pride of the West. On patented land. Long abandoned as a mine.

D. C. COLLIER & CO., San Diego. C. A. Richardson, president; C. O. Reinhold, secretary.

Gold King.[1] R. VIII, p. 513; IX, p. 43; X, p. 543; XI, p. 381; XII, p. 241; XIII, p. 337. Elevation, 4,000 feet. Shaft with several levels. Mill at Banner.

Gold Queen.[1] R. XIII, p. 337. Elevation, 4,000 feet. Shaft 100 feet on vein in granite.

Richmond.

C. J. COUTS, Vista.

Ranchita.[1] R. XIII, p. 334. Elevation, 3,300 feet. Country rock mica-schist. Strike NW. Dip 70° NE. Parallel irregular quartz lenses cut the strike of the schist at about 20°. These lenses seem to terminate on reaching a fault plane striking east and west. They are from 12 inches to 3 feet wide and are 4 feet to 5 feet apart for some distance along the mineralized zone. Incline shaft 145 feet. Several levels and extensive stopes.

A. P. FRARY, ET AL.

Eagle. R. XIII, p. 335. Elevation, 4,200 feet. Developed by cross cut tunnel. Two veins, 1 foot wide. Strike NW. Shaft, 100 feet.

F. McN. HAMILTON, San Francisco.

Chariot North.

FRANK HARRIETT ESTATE, San Diego.

Padlock. Two veins, 2 feet wide. Strike NW. Dip SW Tunnel, 50 feet. Drifts, 200 feet. Depth, 100 feet.

Ruby. R. XI, p. 380; XIII, p. 345.

Washington. R. XII, p. 243; XIII, p. 345. Elevation, 4,200 feet. One vein, 1¾ feet wide. Strike NW. Dip SW. Shaft, 135 feet. Tunnel, 100 feet. Drifts, 100 feet.

G. W. HAZZARD, *San Diego.*

North Hubbard. R. VI, Pt. 1, p. 87; XI, p. 380; XII, p. 241; XIII, p. 341. Elevation, 3,100 feet. One vein, 1½ feet. Strike NW. Dip NE. Cross cut tunnel, 580 feet. Drifts, 500 feet. Depth, 250 feet. Winze on superficial workings.

MARTIN JACOBS, Julian.

Chieftain.

MRS. ROSIE JACOBY, 1007 Lake street, Los Angeles.

Alpha.[1] This is stated to be no longer held as a mine.

H. A. LANDWEHR, 507 Union Oil Building, Los Angeles.

Now controls all mining claims formerly included in the Julian Consolidated, High Peak, Warlock and McAllister mining companies. Also the patented land in Sec. 32, T. 12 S., R. 4 E., consisting of the SW. ¼ of NW. ¼, N. ½ of SE. ¼, SW. ¼ of SE. ¼, SE. ¼ of NW. ¼, E. ½ of SW. ¼.

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[1] Patented.

The mining claims are in three groups as follows:

(*High Peak Group.* Five claims.)

Roosevelt.

Rossland. Formerly North Star.

High Peak. R. X, p. 542; XII, p. 241; XIII, p. 339. Elevation, 4,400 feet. Two veins, 1½ to 4 feet wide. Strike NW. Dip NE. Shaft, 330 feet. Tunnel, 375 feet. Drift, 1,300 feet.

South High Peak. Formerly Homestake.

Ivanhoe. Formerly Three Brothers.

Helvetia.[1] R. IX, p. 145; X, p. 542; XI, p. 376; XII, p. 241; XIII, p. 339. Vein. Strike NW. Dip NE.

(*Warlock Group.*)

Warlock. R. X, p. 544; XII, p. 243; XIII, p. 345. Elevation, 3,300 feet.

Chapparral. R. XII, p. 239; XIII, p. 334.

Warlock No. 2. Formerly Neptune.

Warlock No. 3. Formerly Hastings.

Golden Shamrock. Formerly Golden Rule.

D. F. LANE, Julian.

Golden Gem No. 1. Formerly Mammoth.

Golden Gem No. 2. Formerly Julian.

LINCOLN UNIVERSITY, Lincoln, Neb. E. J. Swayne, agent, San Diego, Cal.

Gardiner.[1]

J. E. MCGOWAN, Julian.

Hassayhampa. Three veins, ½ foot to 2 feet wide. Strike NW. Dip NE. Tunnel, 265 feet. Winze, 100 feet. Drifts, 100 feet.

ROBERT MELROSE, Julian.

Empire.

Homestake. Formerly Wilcox. R. XII, p. 243; XIII, p. 345. Elevation, 3,100 feet. Two veins, 6 inches to 18 inches wide. Strike NW. Dip SW. Open cut 78 feet. Tunnel, 600 feet. Depth, 150 feet.

Stanley.

North Star. R. XIII, p. 342. Elevation, 3,200 feet; 1½ miles SE. of Banner. Two veins 3 feet wide. Strike NW. Dip NE. On first, shaft 45 feet, drifts 40 feet and 28 feet on the vein. On second vein, shaft 115 feet.

ORO BLANCO MINING CO., San Diego. D. C. Collier, president; C. A. Richardson, acting secretary, Union Building, San Diego.

Cincinnati Belle. R. XI, p. 380; XII, p. 239; XIII, p. 334. Elevation, 2,500 feet. Vertical shaft 230 feet deep. Steam hoist.

Kentuck S. R. X, p. 542; XI, p. 380; XII, p. 241; XIII, p. 340. Elevation, 3,400 feet. Shaft 97 feet, with stopes to the surface, now caved. A new tunnel 70 feet on a 6-inch vein. New shaft 100 feet, cut at 50 feet by adit.

Cheerful Moments. Formerly Sauerbrey.

GEORGE R. SAWDAY, Witch Creek.

Tom Scott. Two veins, 1½ feet wide. Strike NW. Dip NE. Shaft, 225 feet. Tunnel, 300 feet. Drifts, 220 feet. Depth, 225 feet.

L. A. SMITH, Julian.

Grand Central. Vein ½ foot to 3 feet wide. Strike NW. Dip NE. Drifts, 200 feet. Depth, 50 feet.

SMOKY CITY GOLD MINING AND MILLING COMPANY, Pittsburg, Pa.

Aguajita.[1]

Elevada.[1] R. XIII, p. 335. Elevation, 3,300 feet. Opened 1894. Vein Strike NW. Dip 60° SW. Shaft, 160 feet. Levels at 50 feet and 100 feet in vein 2 feet to 8 feet wide. Within this zone are 1, 2 and sometimes three veins carrying gold. At 100 feet a fault has displaced the vein.

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[1] Patented.

Venturina Mining and Milling Co. G. G. Wetherby, president, Los Angeles; Nat. Titus, secretary, 434 Union Building, San Diego.

Cable. R. XIII, pp. 332-333. Elevation, 1,300 feet. Development is on 3 adit levels respectively 217 feet, 160 feet and 330 feet long, the last being the lowest. Considerable stoping was done in the upper levels years ago and the lowest tunnel, which was driven to reach the shoot, encountered 2 separate shoots.

Fraction.

H. A. Williams, Julian.

Owens.[1] R. VI, Pt. 1, pp. 85-87; VIII, p. 519; IX, p. 144; X, p. 541; XII, p. 242; XIII, p. 343. Elevation, 4,200 feet. Shaft, 350 feet. 1,000 feet of drifts. Four veins, ½ foot to 6 feet wide. Strike NW. 10-stamp mill, steam hoist and Cornish pump. This property consists of 2 patented claims, each 300 feet wide, and designated as Old Owens and New Owens.

Janet. This claim is the west extension of the two Owens.

San Diego. R. XIII, p. 345. Elevation, 4,000 feet. Two veins, 4 feet wide. Incline shaft 70°, 125 feet. Tunnel, 200 feet.

Townsite. Formerly Fourth of July and America.

GRANITE MOUNTAIN.

This is about 10 miles southeasterly from Julian. Gold was discovered here about 1910. A group of seven claims has been located by W. K. Maull, of San Diego, on the slope of Granite Mountain, at an altitude of 4,100 feet. Their position is in township 13 south, range 5 east, near the section corner 15, 16, 21 and 22. The formation is mica schist and the gold values are in quartz veins. One of these is said to be 8 feet wide, another varies from 6 inches to 2 feet. The strike of the main vein is north 50° and the dip southwest. The development work consists of three tunnels, each about 70 feet long with 40 feet of back.

ORIFLAMME.

R. VI, Pt. 1, p. 89. XIII, p. 342.

This mine, 5 miles southwest of the preceding, is about 6 miles southeast of Banner and 4 miles due east of the Stonewall, in T. 14 S., R. 4 E. Sec. 1 and R. 5 E. Sec. 6. It has been idle for many years and very little is known about it. There was a 10-stamp mill in operation in 1886. Transportation is difficult and wood and water are scarce. The ore body is described as in mica schist 3 to 6 feet wide, 1 foot being very rich. The workings amount to 200 feet of tunnels and drifts. In 1902 the owners were J. S. Buck and S. F. Smith, of San Diego.

STONEWALL MINE.

R. VI, Pt. 1, p. 89; R. VIII, p. 515; R. IX, p. 143; R. X, p. 540; R. XI, p. 382; R. XII, p. 243; R. XIII, p. 345. Register, Mines and Minerals, 1902.

This property is part of the Cuyamaca Grant, owned by the Sather Bank of San Francisco, F. W. Woulfe, trustee. It is situated on the south bank of the Cuyamaca Reservoir.

The country rock is banded mica schist. The vein strikes north 35° west and dips 65° southwest. The mine was located about 1870 and was worked for about five years prior to 1891 by ex-Governor Waterman. A three-compartment shaft was sunk 600 feet and levels driven at 180 feet, 235 feet, 315 feet, 400 feet, 500 feet, 600 feet, north and south on the vein. The total production was about $2,000,000. Between 1888 and 1891 it amounted to $909,442, recorded by the U. S. Mint and the Sather Banking Company of San Francisco.

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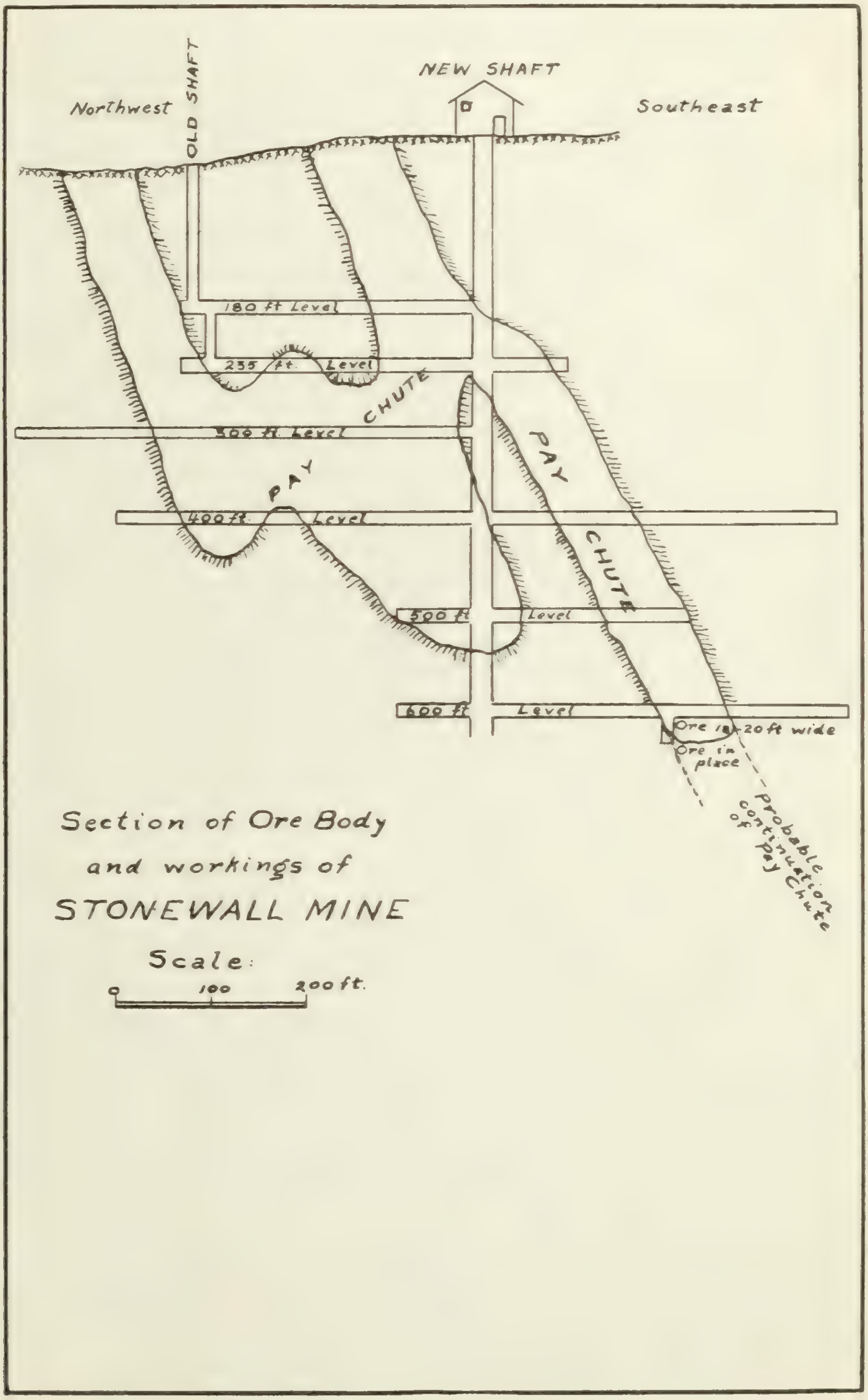
[1] Patented.

Through the courtesy of Mr. Frank Robbins, M.E., of Los Angeles, a section of the ore body is here given.



NOTE.—"Pay chute" above should read, "shoot."

The great production of the bonanza days came from a shoot some 300 feet long which was worked to a depth of 500 feet. Below this level the continuation of this shoot was greatly reduced in size and at the 600-foot level it was worked with a length of 90 feet. Below the 600-foot level a winze was sunk 30 feet, still in ore. The rake of the shoot is to the southeast. At 600 feet the vein is 87 feet from the shaft on the cross cut and the ore body is 160 feet southeast from the shaft on the vein. The ore in places attained a width of 20 feet.

Equipment: Buildings for all purposes; one double reel, hoisting engine 100 horsepower; 1 Ingersoll compressor for 3 drills; 20 stamps; 1 Corliss engine; 5 boilers, 200 horsepower; 1 20-horsepower donkey engine, 1 steam station pump, 2 sinking pumps, 2 water skips, 2 cages, aid drills and other tools.

BOULDER CREEK.

West of the Cuyamaca Grant, on the drainage channel known as Boulder Creek, some claims have been held for several years. There are now 10 of these: Punch Bowl, Little Giant, Condor, Quartzite No. 1, Quartzite No. 2, Apex, Cuyamaca, Golden Eagle, Nebraska and Golden Hill in sections 9 and 10, township 14 south, range 3 east. They are controlled by the Boulder Creek Consolidated Gold Mining and Milling Co., Thomas J. Fisher, President, San Diego; George H. Moyer, Lakeside, vice-president, J. H. Kleine, Lakeside, secretary.

The properties are developed by several hundred feet of tunnels and drifts and are equipped with a 10-ton roller mill and a concentrator.

DEER PARK.

On the east margin of the Cuyamaca Grant, in Sec. 31, T. 14 S., R. 5 E., and near a locality known as Deer Park, about 9 miles northeast of Descanso, are several gold prospects, which have long been known and worked from time to time without becoming producers. The principal of these were noted in R. XIII, page 332, as the Cascade, Combination, Corporal, Hermit, Matamore and Spike and were recorded as the property of John T. Beyers of Descanso. In 1896 they were equipped with a 2-stamp water power mill. In 1902 the Cascade and Independence, both in SE. $\frac{1}{4}$ of Sec. 31, were reported in the Register of Mines and Minerals, as belonging to Messrs. Saybold and Sunnocks of San Diego. At present these properties, relocated as You Bet, are controlled by Messrs. J. H. Schook of Descanso and J. L. Burns of San Diego. The title to them is in the Cascade Mining Company, Will D. Rudd, president; John L. Burns, secretary-treasurer, 311 Union Building, San Diego.

The present holdings of John T. Beyers are not definitely known, as he has not replied to the letters addressed to him. This region was not visited owing to lack of time and its detailed study has unavoidably been left to a future occasion. Several claims have been reported in this vicinity, but no definite information could be obtained concerning them. It is probable that some of them have been abandoned. Those definitely located as to position are as follows.

Name	Position	Reported owner	Address	Reference
Free Coinage Double Standard	S. 12, T. 15 S., R. 4 E.	E. Hawkes	San Diego	M. & M.
Hickory Jim	S. 5, T. 15 S., R. 5 E.	J. F. Neeley, Est.	San Diego	R. XIII, p. 339
Lone Jack Expansion	S. 31, T. 14 S., R. 5 E.	John T. Beyers	Descanso	

PINE VALLEY.

This district is on the west slope of the Laguna Range. A number of prospects have been opened in this neighborhood but the principal claims are those known as: THE NOBLE MINES. Report IX, p. 141; X, p. 544; XI, p. 382; XII, p. 238; XIII, p. 342. These are on the west slope of Laguna Mountain, about 9 miles east of Descanso, and the claims are known as Eureka, Treasury, Bay View, Spring, Spring No. 2, South End, Oxide, Mill Site, Telluride. They are in sections 7, 8 and 17, T. 15 S., R. 5 E., S. B. M. Oxide is in the southeast part of the NE. ¼ of Sec. 17; Mill Site in the southeast part of the NW. ¼ of Sec. 17.

Eureka. Tunnel No. 1, 150 feet, 60 feet below surface on lode. Tunnel No. 2, 350 feet, 150 feet below No. 1, partly cross cut, partly on lode. Shaft at mouth of Tunnel No. 1, 100 feet. Drifts at 50-foot and 100-foot levels about 50 feet long. Ground above 50-foot level stoped 300 feet west of shaft. Open cut on lode 200 feet long. All work in mica schist. Strike in vein north 35° west, 125 feet cross-lode shaft on same vein, about 600 feet northwest of shaft mentioned, 50-foot drift at 50-foot level. Open cut 15 feet deep on surface east of shaft.

Bay View. Tunnel 50 feet on vein. Open cut 75 feet long above tunnel. All in schist. This is a continuation of Eureka vein to the northwest.

Treasury. Tunnel No. 1, 300 feet on vein. Air shaft 125 feet, connecting with tunnel. Tunnel No. 2, 75 feet lower 40 feet long. Hanging wall schist. Footwall granite. This vein is parallel to Eureka vein and distant 300 feet. Between Eureka and Treasury are two other veins on which some work has been done. Tunnel No. 3, 200 feet.

Spring. Shaft 200 feet. Drifts on 60-foot level, 80 feet; on 100-foot level, 150 feet; on 200-foot level, 50 feet. All in schist. Shaft house 20 by 40. Twenty-five horsepower gasoline hoisting engine, blower and pump.

South End. Tunnel 25 feet. Crosscut. Eureka and Treasury veins run through this claim.

Oxide. In schist. Tunnel 250 feet on vein. Air shaft 50 feet. Winze 150 feet, on 100-foot level drift 150 feet. Thirteen horsepower gasoline hoist in tunnel. This claim lies on the east side of the schist belt which is about 1 mile wide.

Telluride. Only surface work and 25-foot tunnel on quartzite. This claim is contiguous to the Mill Site on the east. These veins are in the schist belt which continues southeast several miles.

Mill Site. Crosscut tunnel 40 feet. Shaft 25 feet in quartzite which carries values. The mill is on this claim and also the living quarters. The former consisting of grizzly, ore-bin, Blake rock breaker, self-feed. Five stamp mill, 650-pound stamps, discharging into one 7-foot Lane slow-speed mill, which discharges over 10-foot plates upon two 6-foot Frue vanners. From four to eight months of the year, the mill is run by water power generated by a Knight 40-inch water wheel under 200-foot head. For the dry season there is a 22 horsepower Foos gasoline engine to furnish power. The equipment also includes 10-kilowatt dynamo for lighting mill and house; blacksmith shop with tools; 3,500 lineal feet flumes, 14″x11″; 700 feet 8 inch pipe connecting flume with wheel. Assaying outfit. Five houses and barn.

DESCANSO.

Gold occurs at 300 yards west of this village where Dr. A. J. McDougall controls a number of claims including the Magdalena. The veins trend east and west in diorite. Development work has been carried to the extent of a 100-foot shaft.

A number of claims and prospects are reached from this place, concerning which little information could be obtained. Among them are the following:

Name	Location	Owner	Address	Reference
Clark Mine	9 miles NE. of Descanso	Clark	Descanso	R. XIII, p. 334.
Happy Jack Iron Mask War Eagle	7 miles NE. of Descanso	G. Collier Robbins, deceased		R. XIII, p. 339.
Harper's Mine	12 miles NE. of Descanso. This is within the Cuyamaca Grant	J. D. Harper		R. XIII, p. 339.
Culver El Toro	Quayle Bros. & Cressy		San Diego.	

DULZURA.

R. XI, p. 382; XIII, pp. 335 and 340.

In this district the ore deposits are chiefly in mineralized zones in quartzite and gneiss. The main zone of mineralization is quite extensive, being covered by locations for a distance of 3 miles. It begins in Sec. 8, T. 18 S., R. 2 E., and crosses Sec. 16 diagonally from its northwest corner, bearing about south 39° 30′ east. At some points, in a width of 300 feet there are two or three parallel zones of mineralization. West of the granite, quartzite adjoins a formation of partially metamorphosed black slate and schist. In this, not far from the auriferous zone, is a lens of jasper, which may indicate an equivalence of this slate to the Jurassic, San Luis formation.[1] It may, however, prove to be the Julian formation.

The most extensive holdings are those of Stuart Donohue, comprising the following claims: In Sec. 8, Defiance and New Deal; North Star within Sec. 16, and in Sec. 21 Gold Chief of the Hills, and Golden Artery to the southeast of the preceding. The last two are patented. Beyond them in Sec. 22, along the same mineral zone, are Imperial and Owl.

In Sec. 16, which is School land, are the Johnston and Oneida properties, controlled by Elliott Johnston and others of San Diego. In Sec. 22, east of the Donohue claims and nearly parallel to them are the Pasadena and Banco de Oro claims, controlled by John Fogarty and Charles Burroughs, 553 Fifth street, San Diego.

The owners have been prospecting and developing their claims for some twenty years, but, while much work has been done, no large bodies of rich ore have been found and no substantial production has been attained. The Donohue properties are equipped with a 2-stamp mill.

It seems as if this mineral zone deserves careful study to determine its availability for operation, on a large scale, as a low grade proposition.

Barber Mountain, 4 miles northeast of Dulzura is in Sec. 12, T. 17 S., R. 2 E. There is a property on the southeast side of this mountain, formerly controlled by the Barber Mountain Mining and Milling Company, and now called the Gold Star claim.

The owners are William Hooper and W. E. Kitzman of 846 Fifth street, San Diego. The ore is auriferous chalcopyrite, which occurs in stringers. Development has been conducted by a tunnel 80 to 100 feet long.

MEXICAN BORDER DEPOSITS.

Gold is found at many points near the Mexican boundary, on both sides of the line and in placers as well as in veins. From the placers considerable gold has been taken by hand labor, but none of the veins have yet become producers in a substantial way, though quartz specimens of high grade are often brought in by prospectors.

Near Tecate, Campo and Jacumba, occurrences of this nature have been reported many times during a number of years.

COPPER.

Copper minerals, in limited quantity, are found at several points within this county. One locality called the Defiance District is in the extreme northwestern corner of the county, near the San Mateo Canyon and just north of the Santa Margarita Ranch. It is reached by wagon road from Murietta, Riverside County.

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[1] See San Luis Folio, U. S. Geol. Survey.

All of the claims in this district, mentioned in the Register of Mines and Minerals of San Diego County, have been abandoned. F. McIntosh, of Coronado, was the chief operator.*

This metal has also been found at several points in the hills between Escondido and Encinitas. Some of the claims near Escondido are being kept alive by assessment work, but the old Encinitas Copper mine has not been worked for several years.

This mine is in Sec. 28, T. 13 S., R. 3 W. and is controlled by the Encinitas Copper Company, of which the present representative is W. C. Harland, Spreckels' Theater Building, San Diego. This mine is described in Bull. 50, pages 344–45. There were twenty claims and the vein is 3 feet wide, in porphyry and carries chalcopyrite. There are two shafts and two tunnels on the property. It was proposed to concentrate the ore to prepare it for shipment.

Southwest of Julian the Friday mine, long owned by James Stratton of Julian, is characterized by a considerable extent of iron cap or gossan and shows in its workings copper sulphides and carbonates with small amounts of nickel. This is being developed on a moderate scale. The property which is patented, consists of the north 20 rods of the east 56 rods, SW. ¼ of SW. ¼, Sec. 15, T. 13 S., R. 4 E., and is controlled by the Friday Copper Mining Company, Frank H. Brown, president, American National Bank Building, San Diego; Beecher Stern, secretary, West Coast Gas Engine Company, H and Union streets, San Diego.

The ore body has been opened by a vertical shaft, which is in ore for 60 feet. Below this the vein dips away from the shaft and has been cut by levels at 100 and 130 feet. The upper 60 feet is in the zone of oxidation. At 100 and 130 feet the ore consists of copper sulphides carrying nickel up to 22 per cent.

Assays, Friday Copper Mining Co.

By C. E. Anthony, San Diego, Cal., September 15, 1913.

Gold	.16 ozs. per ton
Silver	1.3 ozs. per ton
Copper	2.4 %
Silica	25.20%
Aluminum and iron	40.24%
Sulphur	5.50%
Arsenic	2.28%
Nickel	22.98%

By C. E. Anthony, San Diego, Cal., December 10, 1913.

Nickel	9.12%

By C. E. Anthony, San Diego, Cal., December 12, 1913.

Nickel	7.78%

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*Since this report was written, W. A. Clark, of Fallbrook, has taken up some claims in the San Mateo Canyon.

By C. A. McAuliffe, Los Angeles, Cal., December 23, 1913.

Nickel	10% (12.8% NiO)
Iron	26% (37.4% FeO)
Gold	$4.90
Copper	Trace
Silver	None
Lead	None

A number of other claims have been located on outcrops near the Friday. Some of these are shown on the Julian map. One of them, the Copper Brick, is owned by Robert Melrose of Julian.

On the San Vicente Grant is a small deposit known as the Barona mine (*see* Bull. 50, p. 345), belonging to L. T. Daley, 1111 C street, San Diego. The vein is in granite and has been explored to a depth of 45 feet. The ore, consisting of copper sulphides and carbonates, carries gold and silver. Chalcopyrite, carrying gold, has been found in small quantities on the east slope of Barber Mountain east of Dulzura. See Gold Star claim under Gold.

From the surface indications, it seems improbable that any one of the deposits, thus far known, has sufficient magnitude to develop into a copper mine of much importance, though some may yield limited quantities of shipping ore.

SILVER.

This precious metal is commercially unknown in San Diego County for the argentiferous lead ores thus far discovered are wholly insignificant. Silver is said to occur in the copper ore at the Barona mine and in that of the Friday mine, near Julian. Further than this silver occurs in small quantities, alloyed with gold, wherever the latter occurs.

In addition to the silver lead ore at Valley Center, a small deposit has been reported from the vicinity of the Noble mines. A. Miller of Descanso at one time worked a claim there.

LEAD.

This metal has been reported in small quantities at several points, the chief occurrence being about 2½ miles north of Valley Center, in the NW. ¼ of Sec. 1, T. 11 S., R. 2 W. Here a formation of mica schist crosses the section obliquely toward the northwest. This schist is quartzose in places and is succeeded on the east by feldspathic quartzite 200 feet thick. Near the north line of the section, in the mica schist, a small outcrop was found, several years ago, containing zinc blende and galena, which, on assay, proved to contain silver. So far as it has been opened, this ore body is small, the vein which dips 60° southwest being about 3 feet wide.

The property is called the Surprise. The chief owner is W. N. Bradbury, who acts as trustee in conjunction with W. H. Baldridge and C. M. Churchill, all of Escondido. The property includes two claims and 80 acres of patented land. The workings consist of a 45-foot shaft and a tunnel 110 feet long with 60 feet of back. Some further exploration was being made at the time of the writer's visit. Lead has also been reported from a point called Metal Mountain on the east side of the Laguna Range and from the vicinity of Deer Park.

ZINC.

This metal is of very sparing occurrence in San Diego County. Besides the Valley Center locality described above, it has been reported from the hills of the San Vicente Grant.

IRON.

R. IX, p. 144.

A few deposits of ferriferous material have been reported in this county but they seem for the most part to be the oxidized capping of veins which, through the oxidation of sulphide ores, have left a formation of gossan at the surface.

The outcrop in Sec. 15, south of Julian is the gossan of the Friday vein, which carries copper and nickel. The 12 to 15-foot vein reported by Goodyear, at corner of Secs. 34 and 35, T. 13 S., R. 2 E. and Secs. 2 and 3, T. 14 S., R. 2 E. and belonging to A. Juch, of Wynola, is said to be of the same character. It is needless to state that such exposures do not represent sufficient tonnage to be of importance as sources of iron ore. They might, however, prove valuable for mineral paint.

MANGANESE.

This metal is nowhere in the county known in commercial quantity. A mile and a half northwest of Jacumba are surface indications of manganese in the form of superficial deposits of the oxide. Some of these may come into use for mineral paint. It has also been reported from the vicinity of Campo.

MOLYBDENUM.

With the advance of civilization, this metal is becoming of increased importance. For a long time its chief use was in the manufacture of ammonium molybdate employed as a chemical reagent in the determination of phosphorus and therefore much used in iron and steel analysis. Sodium molybdate is a blue pigment used in coloring pottery and porcelain, including artificial teeth. Lately it is frequently used with iron in steel alloys for tool steel and for magnets, up to 6 per cent being employed. It is also used in supports for the lower ends of tungsten filaments in electric lamps, and to some extent in electric furnaces.

Ores of this metal have been found at several points in this county. They are reported from the international boundary southeast of Campo and at several points between Campo and Julian. The chief deposit thus far discovered is about 11 miles from Foster and 7 miles northwest of Ramona, on the south edge of the San Pasqual Valley. The ore is chiefly molybdenite, the molybdenum sulphide containing 60 per cent molybdenum, with a small amount of molybdite or molybdenum oxide. It occurs disseminated in flakes and small masses in a micaless granite or aplite which appears to be a dike in the surrounding biotite granite. The prospect work has opened the rock at several points and the molybdenum minerals occur in a zone 30 feet or more in width. Samples of the granite have proved, on assay, to contain 2 to 2½ per cent molybdenum sulphide. Dr. A. S. Eakle determines the dike rock carrying the molybdenite to be a quartz-feldspar mixture without magnesian silicates. A thin section shows orthoclase and quartz predominating, a small amount of albite, microcline and magnetite.

This property belongs to Mrs. E. M. Bour, 918 Harrison ave., San Diego, but is controlled by the Santa Maria Molybdenum Mining and Milling Company, president, E. W. Bour; secretary, E. A. Wagener, 1254 First street, San Diego. Lying in the SW. ¼ of Sec. 3, T. 13 S., R. 1 W., which is covered by agricultural patent, the dike trends southeast, passing into Sec. 10.

TIN.

Some years ago, before Riverside County was formed, San Diego County included the tin mines of Cajalco, but at present no deposit of tin ore is known within its limits that can be regarded as of commercial importance.

Placer miners, working in the mountain gulches, have brought in, from time to time, specimens of black sand containing small grains of Cassiterite or oxide of tin. The principal localities are the gulches on the east slope of the Laguna Mountain. It is also reported from some of the placers in Pine Valley and from the south end of Viejas Mountain east of Alpine, but the latter report lacks confirmation. Another reported discovery is in the Defiance copper district north of the Santa Margarita Grant.

This metal is chiefly used in making tin plate, but also for tin foil and in various alloys such as babbitt, solder, electrotype metal, bronze, etc. The chlorides of tin are used in the silk industry and in dyeing and calico printing.

NICKEL.

This metal, up to 23 per cent, was found by assay in ore from the Friday mine near Julian, which had long been known as a copper prospect.* A small sample shown to the writer had the appearance of Niccolite, a nickel arsenide. No substantial ore body has yet been developed but exploration is now in progress. The association of copper with the nickel involves the use of wet processes in its metallurgy. The chief use of nickel is in making nickel steel which is very tough and resistant to shock. A compound of nickel and iron called invar is used for steel tapes and watch springs, since it varies but little with change of temperature. A very large amount of nickel is used in nickel plating. The metal is also used as a reagent or catalyzer in hydrogenating oil.

Since this area was visited the nickel discovered has attracted much attention. Many new claims have been located and development has been started at several points. A recent discovery of this metal is on the old Gilson property, on the line between the SW. ¼ of Sec. 15 and the SE. ¼ of Sec. 16, T. 13 S., R. 4 E. Rumor mentions an ore body 15 feet wide, averaging 8 per cent nickel at 130 feet depth.

ANTIMONY.

This metal, probably in the form of the sulphide, stibnite, has been reported from several points about the Laguna Mountain, but no definite locality has been announced and the quantity discovered is probably small. Stibnite has also been reported from a point 4 miles west of Jacumba. Antimony is chiefly used in hardening alloys. Its property of expanding in cooling after fusion makes it invaluable in alloys for type metal as it receives sharp edges from the matrix.

BISMUTH.

This metal has been found in small quantities, associated with amblygonite in the lithia vein at Pala. It occurs both as native bismuth and as an oxide. Small samples of native bismuth have been reported from other points, especially near Jacumba. Its uses are in fusible alloys for electric fuses, for protecting boilers, etc., in painting on glass and porcelain and in medicine.

TUNGSTEN.

Trivial specimens of the ores of this metal are said to have been found from time to time, and in the State Museum at San Francisco is a specimen marked Julian, A. J. Burnett; but no deposit has yet been observed which promises to be of any commercial importance. Tungsten is chiefly used in making high grade tool steel, either alone or alloyed with molybdenum and chromium. Its steel alloys have great toughness, and they are used for armor plate and projectiles. It is also used in place of platinum for crucibles and electric furnaces. In the form of fine wire it is extensively used for filaments in incandescent lamps. Sodium tungstate is used as a mordant in dyeing, for weighting silks and for making cloth inflammable.

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*See Friday mine, under Copper, for assays showing nickel.

NON-METALLIC MINERALS.

BUILDING STONE.

With the rapid growth of San Diego as a city and the increasing demand for materials of construction, the use of building stone has rapidly increased and several quarries have been opened in the granites which are so abundant and so easily accessible to transportation. Economy in building, however, is an important factor and the cheaper materials, brick and reinforced concrete, are so generally in use that the more costly granite is chiefly used for monumental and decorative purposes.

No sandstones have been found in the county suitable for building. Near Valley Center is a quartzite which may be fit for quarrying. A few localities of marble are known but have not yet been developed. These are discussed under the proper head.

GRANITE.

Bulletin 38, pages 52-3.

Granite occurs in this county in great variety and abundance, and in excess of all possible future demands. The determining factors in selecting a location for a quarry are first, quality of material and second, convenience for transportation. The larger granite areas throughout California are, consequently, seldom of commercial interest because through altitude or otherwise, they are usually remote from lines of transportation. The quarries of granite opened in San Diego County, as well as those of the other building stones, are, therefore, easy of access.

The following companies and persons are now operating:

Simpson-Pirnie Granite Company, James Simpson, president, Peter C. Pirnie, secretary. Office and works. Two quarries are worked. One is near Santee station on the San Diego, Cuyamaca and Eastern Railway, 25 miles from San Diego in the east side of the hill south of the station. The property comprises 49 acres.

The granite is quarried by hand. The stone is a bright-colored, light gray grano-diorite with a reddish to brownish tint on the weathered outcrop. In some places this discoloration from the oxidation of the iron extends several feet below the surface, while in others it is merely superficial. For the most part the rock is massive and almost free from open seams. It has a remarkably straight fracture, and is easily obtained in rectangular blocks as large as can be handled. There is little stripping and no expensive waste in quarrying. The stone is quite uniform in texture and color, with the exception of a few small blotches caused by local segregation of dark mica flakes. It is largely used for monuments, and for this purpose is cut and dressed at the company's yard in San Diego and shipped in considerable quantities to Los Angeles and other points in southern California. It also makes an excellent building stone, for which it is used to some extent. The annual product amounts to 5,000 cubic feet of dimension stone, 200,000 of paving blocks and 1,500 tons of riprap.

A second quarry of light gray fine-grained granite, controlled by this company, is about 1½ miles west of Foster, in the E. ½ of SE. ¼, Sec. 35, T. 14 S., R. 1 W. The product is used for monuments and paving blocks, the annual output being about 3,000 cubic feet of dimension stone and 100,000 paving blocks.

Andrew Lehnberg, of Foster, operates a quarry on El Cajon Grant, west of Foster, and about 600 yards south of the Simpson-Pirnie quarry. This is also a biotite granite. He also operates a quarry of dark green rock near Lakeside, which Dr. A. S. Eakle has identified as a diorite. This material is derived from boulders, no ledge having yet been opened.

The old Waterman quarry lies 1¼ miles northeast of Foster, near the road to Ramona, in E. ½ of SW. ¼ of Sec. 30, T. 14 S., R. 1 E. It is now owned by Mrs. Emma Cartwright, of Foster, and worked by James and John Grant, of the same place. The rock is a biotite granite, and was used for the Government buildings at Fort Rosecrans.

The old quarry east of the station, owned by Joseph Foster, of Foster and San Diego, is now idle. Until recently, it was leased by the Pacific Electric Railroad Company which quarried paving blocks there.

Charles G. Moore, 2336 Superba street, San Diego. This quarry, which has been in operation about five years, is east of La Mesa, in the east 370 feet of the S. ½ of the SE. ¼ of the SW. ¼ of the SE. ¼ of Sec. 17, T. 16 S., R. 1 W. This stone, which is a diorite, is wholly used for monumental purposes and about 8 carloads of 200 cubic feet are consumed annually.

San Diego Granite Works, corner Eleventh and M streets, San Diego, Fred Fickas, proprietor. Formerly operated a quarry near Mt. Helix, one quarter mile east of Hotel Grossmont. Also at one time operated the quarry near La Mesa, now controlled by Charles G. Moore. It now uses stone from the Simpson-Pirnie quarry west of Foster and from Lehnberg's quarry near Lakeside.

South of Grossmont station is a small quarry on land owned by E. Fletcher, of San Diego, and operated by the Pacific Electric Railway Company for paving blocks. The rock is a hornblende, biotite granite and cleaves into rectangular blocks of great regularity.

Dr. A. S. Eakle's determination of these rocks is as follows:

Pirnie-Simpson, Santee. Granodiorite. A thin section shows much triclinic feldspar as well as orthoclase, a small amount of quartz, biotite and hornblende.

Pirnie-Simpson, Foster. Light gray fine grained granite. A thin section shows much hornblende and orthoclase, little biotite and plagioclase. Some magnetite. The orthoclase is somewhat kaolinized.

Lehnberg, Foster. Biotite-granite. Light gray granite. A thin section shows much quartz and orthoclase, a small amount of plagioclase and brown biotite. Grains of magnetite occur.

Lehnberg, Lakeside. Hornblende-diorite. A thin section shows plagioclase predominating and scattered plates of hornblende. A few rods of biotite occur. The rock has a sprinkling of magnetite with an occasional grain of pyrite.

Waterman, Foster. Granite. A thin section shows quartz, orthoclase, a little plagioclase, some biotite in stringers, very small hornblende, chlorite and magnetite. The orthoclase is slightly kaolinized.

Moore, La Mesa. Diorite. A thin section shows plagioclase predominating, a little orthoclase, biotite and hornblende in about equal amounts, some apatite needles and magnetite grains. An occasional augite crystal occurs.

Pacific Electric Railway Company. Grossmont. Light gray hornblende-biotite-granite. A thin section shows much plagioclase and orthoclase, large plates of biotite and hornblende and some magnetite.

LIMESTONE AND MARBLE.

Limestone, which mainly consists of carbonate of lime, is used for building and ornamental purposes, but chiefly in the metamorphic or crystalline form, which is known as marble.

In San Diego County crystalline limestone occurs at many points, in the areas of metamorphic rocks, but owing to lack of transportation in the regions where it occurs, little attention has hitherto been given to this material.

Near Deer Park, in Sec. 1, T. 15 S., R. 4 E., are two claims, located on white marble, known as North Glacier and South Glacier, controlled by C. P. Hayes, Wm. A. Berkey and Zoe Beyers Vernon. This interest is represented by G. T. Vernon, 523 Timken Building, San Diego, and J. G. Beyers, of Descanso. It is at present intended to undertake the manufacture of lime, bringing the product to San Diego by motor truck.

About 4½ miles northwest of Borrego Springs, Secs. 2 and 3, T. 11 S.,

R. 7 E., is an outcrop of limestone on which claims have been located by Dr. D. B. Northrup, 771 Twenty-second street, San Diego, and T. A. Eckert.

Very extensive deposits of marble, of several shades of color, which will soon be made accessible by the San Diego and Arizona Railroad, are in Coyote Mountain, T. 15 S., R. 10 E., a few miles east of the San Diego County line. These will be described under Imperial County.

About 4½ miles northeast of Dos Cabezas Springs, Sec. 21, T. 16 S., R. 8 E., are two claims covering a deposit containing two colors of marble, and belonging to the Golden State Mining and Marble Company, C. A. Walker, president, Watts Building, San Diego. One stratum, extending about 600 feet in length and 20 feet in width, is pure white, interspersed with tiny black dots. This marble is of high grade, fine grained, slightly harder than common marble and takes a high polish. Adjoining this stratum is one of light gray blue over 600 feet in length and about 180 feet in width. This is of the same quality as the white and black dotted, and is well suited for interior decoration, as in corridors and panels. This deposit lies about 1 mile from the San Diego and Arizona Railroad, but must await the completion of that line.

Near Jacumba, Sec. 2, T. 18 S., R. 8 E., is a dark gray marble on which some claims were located by Mr. L. A. Blockman, of San Diego.

MEXICAN ONYX OR ONYX MARBLE.

This handsome ornamental stone is mineralogically aragonite, a form of carbonate of lime often deposited from hot springs. The only occurrence in this county has been reported from the valley of Los Peñasquitos Creek on the grant of that name.* The exact locality could not be ascertained by the writer.

JASPER.

A deposit of red and white banded jasper occurs southeast of Dulzura, east of the Donahue gold mining claims. Dr. C. C. Vallé, of San Diego, is the owner of the property. This material is handsome and may become valuable for ornamental purposes, but it has not yet been offered on the market.

ORBICULAR GABBRO.

Bull. 38, p. 56.

About 6 miles east of El Cajon on the north bank of the Sweetwater River, and about 1 mile west of Dehesa, in Section 14, T. 16 S., R. 1 E., is a large mass of gabbro, portions of which have an orbicular structure and show a highly ornamental surface when polished.

This gabbro is intrusive in the midst of the granite. It outcrops over an area of about a square mile on the hill near Dehesa and extends 3 or

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*Bulletin 38, page 369.

4 miles southeast. The hill on which it occurs rises about 1,800 feet above sea level. On the slopes, in the central portion of the gabbro mass, the orbicular rock occurs in scattered boulders, which vary in size, some of the larger ones being several feet in diameter. It has not, however, been found in place.

There are three varieties of this orbicular rock, based on variations in its texture. In the most common variety, an outer ring of feldspar surrounds a nucleus consisting of a crystalline aggregate, much like the ground mass of the rock. Another variety consists of spheroidal bodies showing neither concentric nor radial structure. These appear to be harder and of firmer texture than the surrounding material and, on the disintegration of the rock by weathering, rounded balls remain like pebbles in the residuum. The third variety has both radial and concentric structure.

The rock consists of the plagioclase feldspar, anorthite, hornblende, hypersthene and iron oxide. It varies considerably in texture outside of the spheroids, some portions of the mass being rather finely crystalline and others quite coarsely crystalline. Some of the hornblende crystals, in place along joint planes, are several inches in length. The basic character of the orbicular portions is shown by the analysis of an orbule.

Analysis of an Orbule of the Gabbro by Jas. W. Howson.[1]

[illegible]	I	II
Silica (SiO_2)	40.50	39.76
Alumina (Al_2O_3)	23.01	22.71
Iron oxide (FeO)	11.96	11.96
Magnesia (MgO)	12.24	12.56
Lime (CaO)	11.44	11.39
Soda (Na_2O)	1.19	1.33
Potash (K_2O)	.40	.37

Analysis of the Feldspar of the Gabbro by W. T. Schaller.[2]

Silica (SiO_2)		44.39
Alumina (Al_2O_3)		36.55
Lime (CaO)	18.67	
Soda (Na_2O)	.83	

This analysis indicates anorthite or lime feldspar.

This orbicular gabbro is adapted to interior decoration, because of its variegated texture and color. Without being gaudy or bizarre, it has a rich coloring and a unique configuration that should catch and please the eye.

No definite estimate can be made of the quantity of this stone now available. It is seen only in boulders, and these form but a small percentage of the boulders on the hillside. Their occurrence is such as to leave one in doubt as to whether they came from a single dike-like portion of the mass, or from several separated portions. The number and size of the boulders scattered over the surface indicate that there is considerable stone here available for commercial purposes, and exploration may reveal the rock in place. If it should be found in sufficient quantity to furnish a constant supply to the market, and to fill orders in a reasonable time, it ought to readily find a place among ornamental stones. Since it is almost unknown as a commercial product, architects would be slow to specify it until assured that it is obtainable in quantity.

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[1] Univ. of Cal. Dept. of Geol. Bull. No. 17, Vol. III, p. 394.
[2] Bull. 38, p. 59.

This gabbro area was first mentioned by Fairbanks, R. XI, p. 85. The orbicular rock was first discovered by Marion Powers , of Dehesa. Professor A. C. Lawson, of the University of California, gave a short description of it in ''Science,'' Vol. XV, page 415, and a more extended one in Bull. No. 17, Vol. III, Dept. of Geol., Univ. of Cal. W. H. Kessler and W. R. Hamilton, of Stanford University, made a study of this rock and published an excellent illustrated description of it in the American Geologist for September, 1904. See Bull. Nos. 37 and 38, State Mining Bureau.

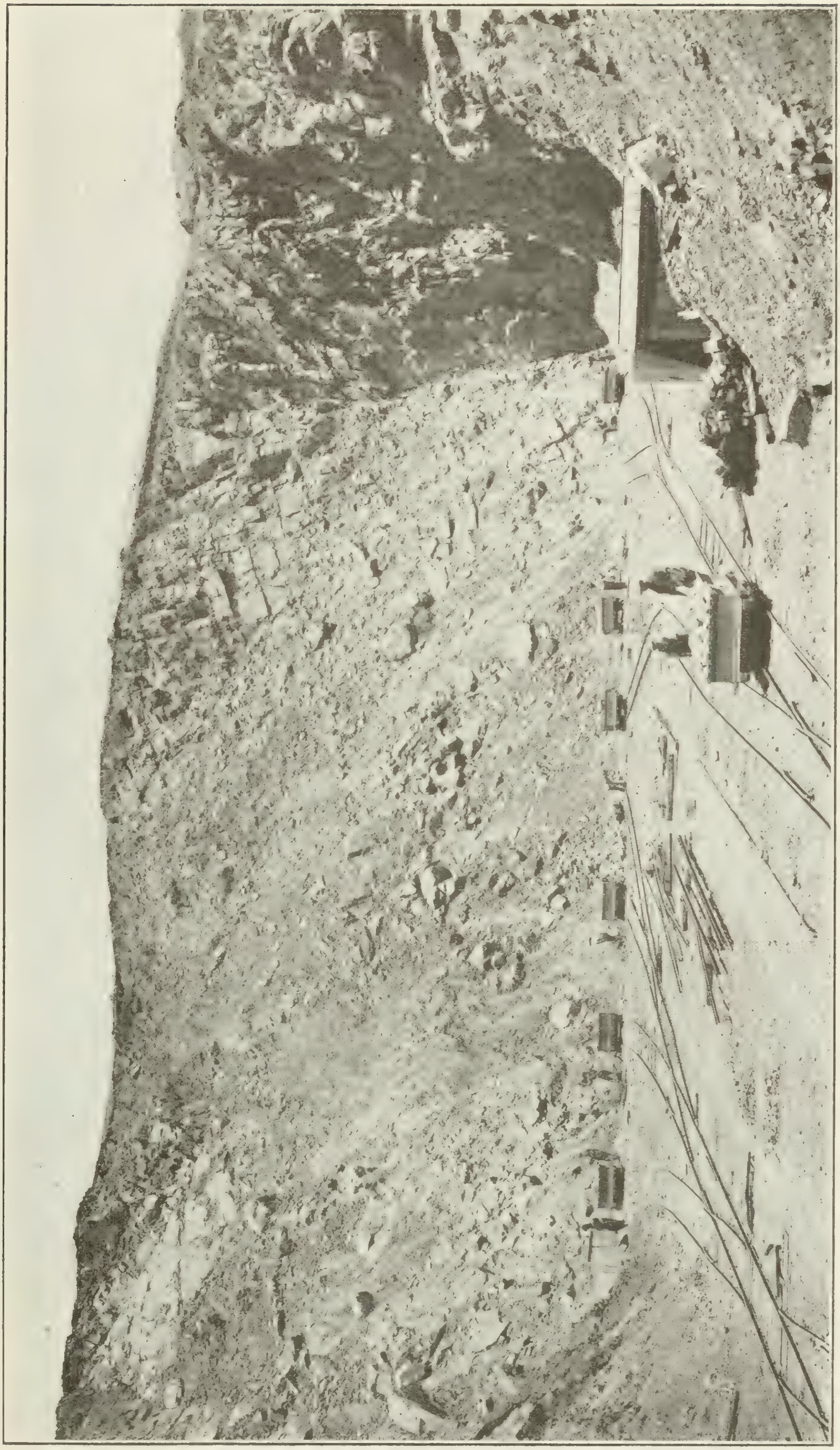
The deposit is controlled by N. Kessler and Marion Powers, of Dehesa.

CRUSHED STONE AND SAND.

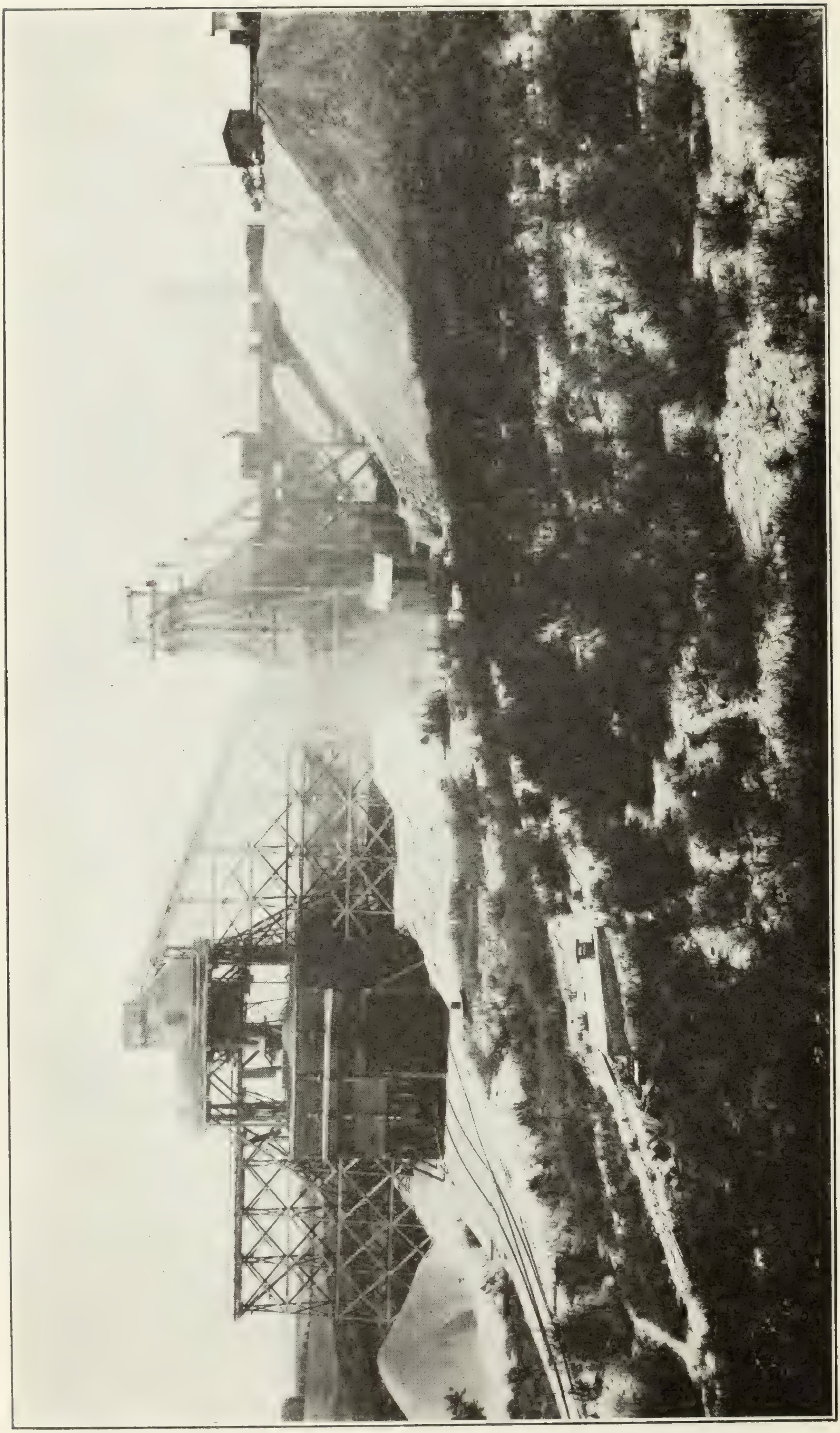
The large demand for crushed stone and sand for concrete and their ever-increasing consumption make these materials of great importance to a municipality.

San Diego is especially favored in the extensive area of intrusive felsite which is now quarried at Spring Valley and Sweetwater Dam, and, if necessary, could be quarried at other points. The gravel from the Otay River Valley and from Rose Canyon as well as from other areas around the Mesa is almost entirely of felsite or some other volcanic rock of similar qualities.

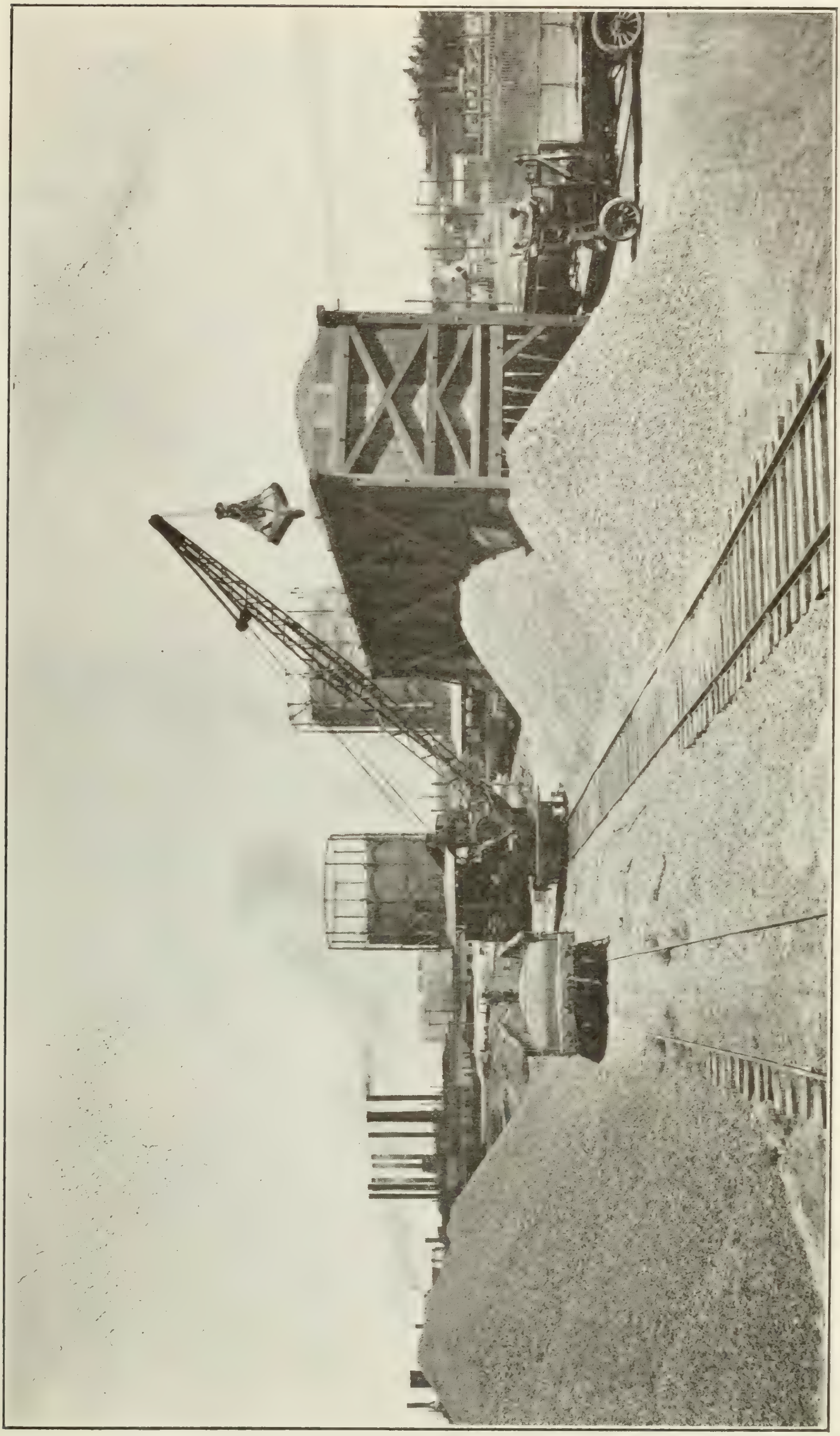
Independent Stone Company, 713 American National Bank Building, Geo. L. Parker, president, L. J. Rice, secretary. This company produces crushed stone for concrete and sand for the same purpose and for general building operations. The stone quarry is southwest of Spring Valley station on the west side of the track. The crushing plant is on the east side of the railroad at the same point. The rock is a fine grained felsite which forms a hill immediately north of Lemon Grove, rising some 300 feet above the mesa level. The production of crushed stone is 75,000 tons per year.



Quarry of the Independent Stone Co. Near Spring Valley.



Crushing Plant of the Independent Stone Co. Near Spring Valley.



Filling Storage Bins. Independent Stone Co.

Building sand washed from the neighboring granite areas is shipped by this company from the river bed one half mile south of Foster and 300 feet west of the railroad track. The sand is loaded into cars by a Brown hoist of 15 tons capacity, using a 5½-foot bucket. At the delivery station, at Thirteenth and Newton streets, San Diego, the cars are unloaded and the sand transferred to storage bins by a Bay City Industrial Crane, using a 1-yard bucket. Production 40,000 tons per year.

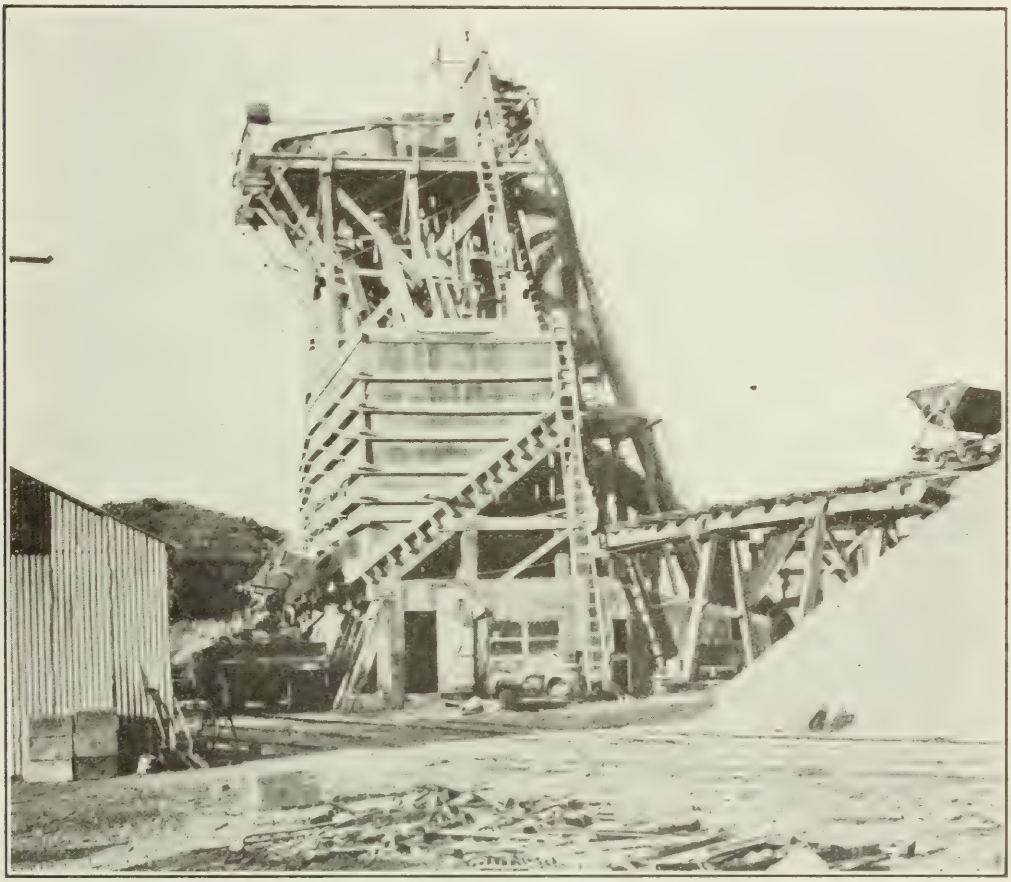
San Diego Stone Company, 643 Spreckels Building. President and manager, E. A. Hornbeck; secretary, C. Kalbough. This company produces crushed stone for concrete. The quarry opened in 1887 for Sweetwater Dam, is west of the dam on the south side of valley. The property consists of 15 acres held in fee, a portion of the Rancho La Nacion. Gates and Simons Disc crushers are operated by electric power. Daily capacity of plant 400 tons. The annual production of crushed stone is about 49,000 tons. Of riprap and jetty stone 21,000 tons.

Sweetwater Quarry, San Diego Stone Co. Sweetwater Dam and Mt. St. Miguel. F.J.H.M. Photo.

Fenton-Sumption-Barnes Company, 168 Tenth street. H. G. Fenton, president; H. W. Sumption, secretary. This company produces gravel and sand from the valley of the Otay river and sand from the Tia Juana Valley. The sand consists of two grades; coarse for concrete and fine for mortar. The gravel is produced in two sizes; one inch and inch and a half. Crushed stone is also produced from cobbles and sold in one inch size. About half of the sand comes from the gravel washing plant in the Otay River Valley. Here the company controls 160 acres along the stream bed in Secs. 22 and 23, the plant being in NW. ¼ of the SW. ¼ of Sec. 22. The company also works a deposit of sand in the

SE. of Sec. 1, near Tia Juana. Other sand tracts are controlled near Riverview and Lakeside, each about three quarters of a mile long and comprising 100 acres. The sand here is loaded with a locomotive crane and sold in its natural state. The plant began operations in June, 1912, and from that time until May, 1913, were shipped 5,859 cars of 25 tons each, two thirds of these being of crushed stone and one third sand. From the plant at Otay shipments amount to 350 cars per month.

The Sylvan Gravel Company, J. P. Stibolt, president and manager, J. Brown, secretary.



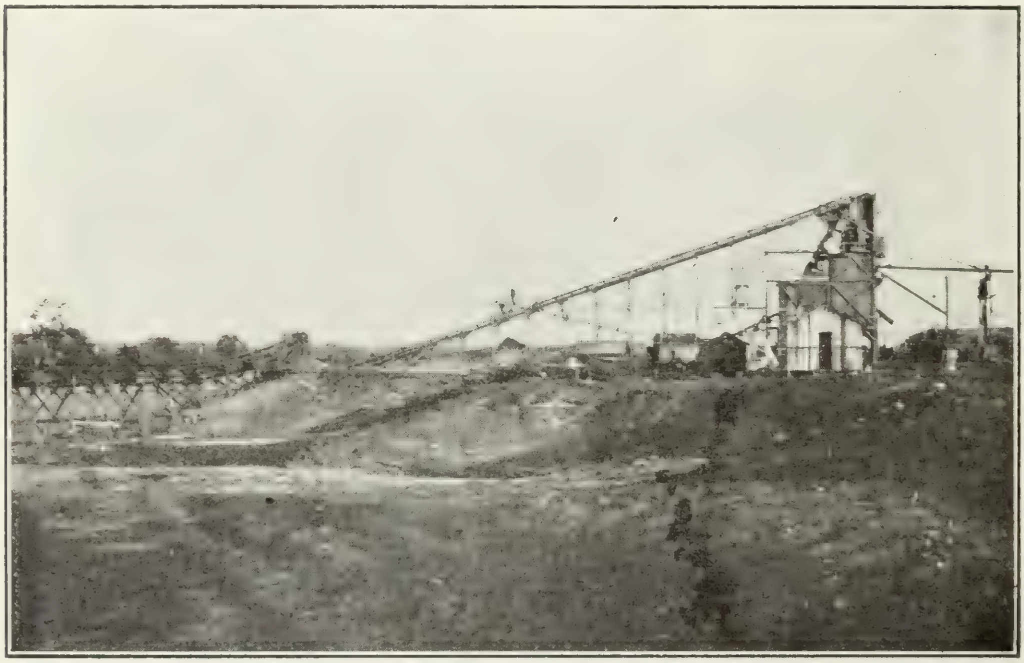
Crushing and Screening Plant. Sweetwater Quarry, San Diego Stone Co.
F.J.H.M. Photo.

This company operates a plant in Rose Canyon near Selwyn station, using gravel and cobble stones from the arroyo bottom. A small crushing plant is in operation. The city office is at the southwest corner of Eighth and M streets.

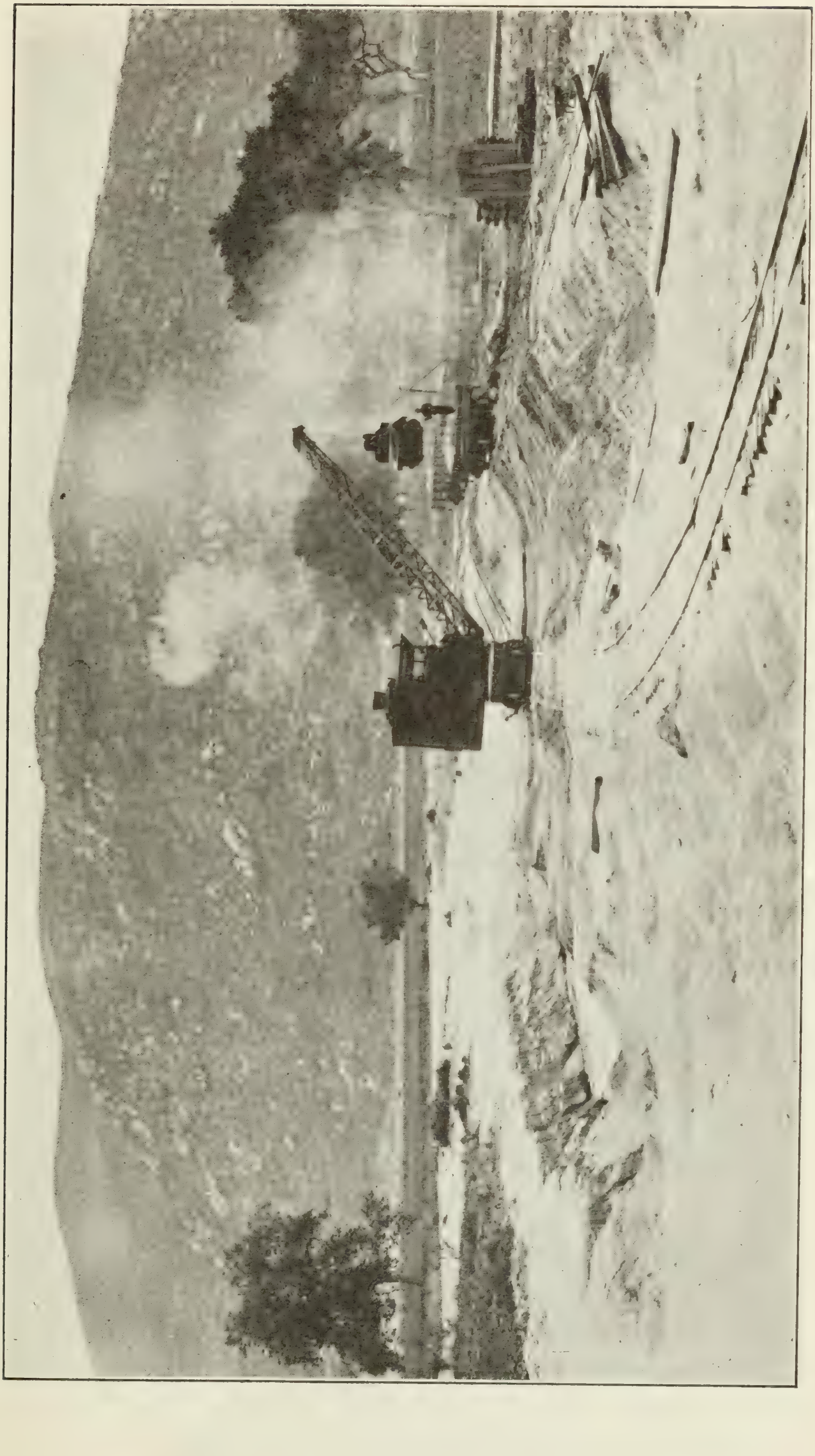
The Mission Rock Company, 111 C street, L. T. Daley, president; Geo. W. Pierce, secretary.

This company operates a plant in Murphy's Canyon, north of the Mission Valley. The chief product is crushed cobble stones. Having been in operation only since August, 1913, it has not yet attained much production. Its capacity is 50 tons per day, using a No. 3 Austin gyratory crusher. A washing plant is now being installed.

In the Mission Valley several other companies have gathered sand for building and marketed it in San Diego. In the northern part of the City, east of the State Normal School, a small portable plant is operated by Ole Nelson for crushing cobble stones for concrete.



Sand and Gravel Washing Plant. Fenton-Sumption-Barnes Co.
Otay River Valley. F.J.H.M. Photo.



Loading River Sand near Foster. Independent Stone Co.

LIME.

Lime (CaO) is the oxide of the metal calcium and, in some form is the basis of all mortars and cements used for building. When comparatively pure it is common lime, or quicklime. When mixed with a small percentage of clay or silica it forms poor or meager limes, with the increase of clay it forms hydraulic lime, and when mixed with clay in proper proportions and properly burned and ground it forms Portland cement. Lime combined with sulphuric acid forms calcium sulphate, which occurs in nature as gypsum and makes plaster of paris.

The numerous beet sugar factories in this state use large quantities of lime, several quarries being operated for these factories alone. The manufacture of beet sugar being liable to increase in the near future, an increased demand for lime for this purpose can be expected. The remainder of the product is used for furnace flux, as a fertilizer, for mortar and plaster in building operations, in glass manufacture, and other minor industries.

Lime is produced commercially, by heating limestone in furnaces known as limekilns. Limestone consists of calcium carbonate, which, when sufficiently heated loses its carbon dioxide, which escapes as a gas, and the quicklime remains. Limestone begins to lose carbon dioxide at about 750° F., but requires a temperature of over 1300° F. before it is driven off. In chemically pure carbonate, there are 56 per cent of lime and 44 per cent of carbon dioxide, but there are also nearly always present, some moisture and organic matter, which are driven off, and varying percentages of clay, magnesia, iron oxide, etc., which are not driven off, in the burning. So the resulting lime may vary from 56 per cent to 30 per cent or less of the stone. Moisture in the stone facilitates the burning, so that a freshly quarried, moist stone is more readily reduced than a dry one. Hence a dense, compact stone is reduced with greater difficulty than a porous one, but the quality of lime is better.

Lime and cement, as materials of construction, are so important in the development of a city like San Diego, that there is little doubt that in the near future, lime will be burned within the county and that the necessary association of lime and clay will be found at some point conveniently situated for the establishment of a factory for Portland cement. In 1890 a beginning was made with a calcareous deposit on the Jamul grant by the erection of a cement factory.[1] It was found, however, that at that time, it could not be made and delivered in San Diego in competition with European Portland cement brought by water freight. This deposit, with the whole of the Jamul Grant, belongs to J. D. Spreckels and has been carefully experted for him, but not found of sufficient promise to justify further operations. As railroads are built through the country and, with the perfection of the automobile truck, means will be found to make these valuable materials and bring them to market at reasonable prices.

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[1] R. IX, pp. 139 and 309–11; XI, p. 383.

Calcareous materials are not especially abundant in the western part of the county, for the Tertiary deposits conceal palæozoic and mesozoic strata which may be calcareous. We must, therefore, look chiefly to the country east of the mesas where, in the metamorphic formations, are numerous limestone outcrops. One of these is near Deer Park east of the Cuyamaca Grant,[2] another is in the area east of Warner's ranch. On the road to Oak Grove there is said to be an old limekiln near Deadman's Hole. On the eastern slope of the divide, in the region of Jacumba and northward from that point, an abundance of limestone is reported. An outcrop of this material occurs 4½ miles northwest of Borrego Springs. Some of these deposits will be made accessible by the San Diego and Arizona Railway, now under construction.

In the mesa itself, near Otay, is a calcareous layer not far below the surface. A similar deposit occurs near Lemon Grove, but these are of insufficient thickness, so far as known, to be of commercial interest.

BRICK CLAY.

At the outset, surface clays were generally used in San Diego for the manufacture of brick, but it has been discovered that, in the bluffs of Rose Canyon, about 10 miles north of the city, are extensive exposures of Eocene Tertiary clay or shale, extending for a distance of some 3 miles north from Ladrillo on the Atchison, Topeka and Santa Fe Railway, and well adapted for making brick and building tile and easy of access through their nearness to the railroad. Consequently, now, all the brick companies are using this shale in their manufactures and all but one have located their plants in this canyon. At some points, certain layers of this shale exhibit the property of vitrifaction, but no vitrified brick is yet being manufactured.

While as yet out of reach, in regard to transportation, attention must be drawn to the great areas of Miocene Tertiary clays which occur on the eastern margin of the county, where the deposits of the Salton Basin lie in the re-entrant bays of the granite ranges. (See geologic map.) The extent of these is very great, amounting to several hundred square miles, but little is known of their properties.

BRICK.

San Diego Brick Manufacturers.

Bulletin 38, page 254.

The following companies and individuals are now engaged in the manufacture of brick and building tile:

F. L. Hieatt Brick Co., F. L. Hieatt, president; J. R. Jolly, secretary. Plant, corner California and Juniper streets. Now using Tertiary clay from Ladrillo in Rose Canyon. The plant consists of 1 dry press, 18,000 daily capacity, and 1 stiff mud machine, 60,000 daily capacity. Electric power is used and about 20 men are employed. Oil is used to heat the kilns.

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[2] See Marble.

Union Brick Co., corner Twenty-third and Pierce streets. This company, formerly in San Diego, has recently moved its plant to Rose Canyon.

R. M. Hubbard, 548 Spreckels Theater Building. This plant is in Rose Canyon near Ladrillo in Pueblo Lot 1787. The equipment is a Penfield stock machine using electric power; 20 to 25 men are employed. These kilns are heated with crude oil.

Rose Canyon Brick Co. Plant near Ladrillo. J. S. Akerman, 1311 E. First street. This plant is now idle.

San Diego Vitrified Brick and Clay Products Co., president, C. E. Anthony; secretary, C. H. Anthony. Office, 858 Fourth street. This company controls 100 acres of Tertiary clay on Rose Canyon, in Pueblo Lot 1267. The equipment is one dry press of 20,000 capacity, operated by electric power. The company claims superior vitrifying properties for the clay which it controls and proposes to manufacture paving brick and other similar products.

Sunnyside Brick and Tile Co. This company is also in Rose Canyon, west of the preceding.

In addition to the brick made in San Diego, a large quantity is shipped in from Los Angeles.

POTTERY MATERIALS.

Bulletin 38, page 227.

Pottery clay, kaolin, feldspar and quartz have long been known in San Diego County, but, until recently, no one had invested the capital necessary to carefully investigate and utilize them. This work has recently been undertaken by the California China Products Company, Walter Nordhoff, president, C. H. Nordhoff, secretary, which has erected a plant on Twelfth street, National City. This comprises all necessary clay working machinery together with two 18-foot and one 14-foot down-draft kilns. Oil is used as fuel, and electricity for power. About 25 men are employed.

This company was founded to make fine china of the French type, and the proper clays for this purpose were found and located or bought. But on investigation of the labor question it was found to be impossible to make such china commercially in California. A change of plan was therefore made, and, using some of the same materials and others afterward located or bought, the manufacture of glazed Faience tile was begun. This proved so successful that, in addition to mantel and hearth Faience, the extended use of the glazed tile has become common in wainscots and in both interior and exterior floors, whether exposed to sun and rain or protected or partially protected. Its use has been specified for the exterior of the great dome of the California State Building at the San Diego Exposition, and also for floors and wainscots in the New York State Building at the San Francisco Exposition. It has also been used in the better class of stores and club buildings throughout the coast, and is being shipped to New York and successfully sold there in competition with the best American and imported tile. In addition to this Faience tile, experiments have been finished and clay deposits located or bought, which will enable this company to produce in future as they desire, sanitary ware of first rate quality, high tension electric insulators, yellow mixing bowls, and quarry or mission blocks for flooring.

Owing to the labor cost, the company does not propose to manufacture china in any form, but the products specified above will be gradually introduced. The yellow mixing bowls are about ready to go on the market. Only California clays and California labor are used in the manufacture of these products.

The raw materials investigated by this company are from various sources. The larger part of the clay used is from Aberhill, Riverside County. From San Diego County they have experimented with the following:

Kaolin, from the west peak of Cajon Mountain. This has long been known and was mentioned in Bulletin 38, page 227. Besides this locality it has been reported from San Vicente Mountain, Poway and Lyons Peak.

Feldspar, from Sec. 27, T. 16 S., R. 1 E. This is southwest of Dehesa.

Quartz, was obtained from a deposit southeast of El Cajon Mountain.

Yellow burning non-plastic clay, almost fire clay, was obtained near La Costa station. This clay is on the Huchting Ranch and lies in the NE. ¼ of Sec. 25, T. 13 S., R. 4 W.

The use of these materials is still in the experimental stage and no detailed information is available concerning their qualities. Since the writer's visit he is informed that their use has been discontinued.

A deposit of white clay, fit for fire brick, lies on the Kelly Estate, near Farr Station, 7 miles south of Oceanside. This is leased by the F. L. Hieatt Brick Company of San Diego.

No doubt many other deposits will be found in San Diego County, since the great granite ranges must have yielded, by their decay, vast amounts of feldspathic material, but only exhaustive tests by manufacturing interests will definitely determine their value. Mere chemical analysis is suggestive but not final.

Near the plant of the California China Products Company, on Twelfth street, National City, is the workshop of the Markham potteries. This is a new industry recently established by H. C. and K. S. Markham, formerly of Ann Arbor, Michigan, who are preparing to make art pottery of various types, using the Nordhoff kilns for the final execution of the work. It is hoped that this enterprise will prove entirely successful.

GLASS SAND.

Near Boulevard and about one half mile from the surveyed line of the San Diego and Arizona Railroad are three deposits of pure white quartz. They are reported to be free from iron and other impurities and would therefore be adapted to the manufacture of plate glass, porcelain, fluxes and for many uses in the arts. High grade silica is scarce in this region and these deposits appear to be of the best grade.

SAPONITE.

Three miles southeast of Otay there is a deposit of this mineral, a massive, clay-like variety of kaolin, containing a great amount of combined water. It is locally known as ''mineral soap'' and was mentioned by W. A. Goodyear as montmorillonite, R. IX, p. 139. It forms a layer from 2 to 5 feet thick a few feet below the surface of the mesa and underlying several hundred acres. Outcrops have been seen at several points in the bluffs of the Otay River Valley. No commercial use has yet been found for this material.

GYPSUM.

The principal deposits of this material are just over the line in Imperial county and will be described under that head. Small deposits are reported in San Diego County, just west of those above referred to and the Carrizo Creek clays contain plates of selenite, the transparent form of this mineral.

ASBESTOS.

Bulletin 38, page 263.

Two distinct minerals are known in the market as asbestos. One is a form of actinolite, or of tremolite, which are varieties of hornblende, a silicate of lime, magnesia and iron, and has fine, soft, flexible fibers like cotton. Most of the commercial asbestos, however, is a variety of serpentine, called chrysotile or amianthus, a hydrous silicate of magnesia, containing about 14 per cent of water. Though, in many respects, both varieties possess similar physical properties, and the heat-resisting qualities of both varieties are about equal, the chrysotile variety is superior to amphibole asbestos in strength and elasticity. Consequently, for all purposes in which non-conductivity of heat is the important factor and not strength of fiber, as in fireproof paint, wall plaster, boiler and steam pipe covering, fireproof packing of safes, etc., both varieties can be used. Infusorial earth, talc and mica are strong competitors of asbestos in these lines.

In the manufacture of cloth, rope, felt boards, tubes, washers, and blocks of various shapes, strength of fiber is essential, as well as non-conductivity, and only the chrysotile variety can be used. The fibers of chrysotile are usually from one half to 1½ inches in length, and seldom exceed 2½ inches.

Mill fiber, a paper stock, is made of minute fibers of asbestos which have become broken and are not available for weaving. Asbestic is the final waste material, which contains a small amount of minute fibers and a considerable amount of crushed serpentine rock.

In San Diego County, small deposits of good fiber are reported in the mountains three miles east of Warner's Hot Springs. See R. IX, p. 148. No doubt, in time, other deposits will be discovered.

MICA.

This name includes several species, the most important commercially being muscovite and biotite, which are silicates of alumina, with potash, magnesia and iron. Cleaving in thin, transparent plates and resisting heat, muscovite is used for stove doors. For its non-conductivity of electricity, it is used as an insulator in electrical appliances. Pulverized, it is used to give a brilliant surface to wall paper. Biotite, lacking transparency, is chiefly used ground fine as an insulator against heat in fireproof safes. This material is not abundant in San Diego County, but some good sized plates of light colored biotite have been brought from a prospect near Jacumba. This information is furnished by Mr. W. H. Trenchard, of San Diego.

MINERAL PAINT.

For exterior work oxides of iron and manganese are extensively used as well as various colored earths or ochers, which owe their shades of red, brown and yellow to the metallic oxides present. Such materials can be found at several points in this county but thus far no use has been made of them.

The principal deposit which now merits attention as a source of paint is about 8 miles southwest of Escondido and about the same distance from Encinitas in the south half of Sec. 3, T. 13 S., R. 3 W. Here is a bedded deposit of the mineral pinite, usually referred to as palagonite. This, however, is probably an error of spelling for *paragonite,* since palagonite is a deposit of volcanic glass. Claims known as White Hawk, Ocean View and Pinite Queen were located here prior to 1902, and after several experiments in utilizing the material commercially and some financial mishaps the locations passed successively through the Palagonite Industrial Mining Company and the Premier

Investment Company, both of San Francisco, and now are held by the Pacific Paint Products Company, I. P. Janssen, president, J. E. Neal, secretary, 709 Central Building, Los Angeles. This corporation is about to build a factory near the Santa Fe Railway tracks, between Fifty-fourth and Fifty-fifth streets, Los Angeles. Through the courtesy of Mr. Janssen, I am able to quote from the report of a careful examination of the properties by Smith, Emery & Company, of San Francisco.

The deposit is traceable for a distance of some 4,000 feet, its streak being nearly east and west and its dip 45° north. It varies from 70 to 100 feet in width and is underlain by diorite, which forms the foot wall, while the hanging wall is of basalt. Near the foot wall the color is reddish and yellowish, while toward the hanging wall it grows lighter in shade, passing through light yellow and gray to white. The portion available commercially is described as averaging 12 to 15 feet in width.

Analyses by Smith, Emery & Company give the following results:

White.

Silica (SiO_2)	67.47%
Alumina (Al_2O_3)	20.33%
Iron oxide (Fe_2O_3)	1.85%
Lime (CaO)	.09%
Magnesia (MgO)	.13%
Loss in ignition	7.82%
Alkalies (by differences)	2.31%
Total	100.00%

Gray.

Silica (SiO_2)	66.58%
Alumina (Al_2O_3)	21.07%
Iron oxide (Fe_2O_3)	1.93%
Lime (CaO)	.12%
Magnesia (MgO)	.10%
Loss in ignition	8.26%
Alkalies (by differences)	1.94%
Total	100.00%

It is stated that the colored portions of the deposit are very suitable for pigment, both for exterior use and for kalsomine. It is further suggested that the material may successfully be used for polishing powder, paper filler, cosmetic, putty, working crayons, and talcum powder. The report also states that it is available for making tips for coal gas and acetylene burners.

With all these possibilities it is to be hoped that the owners will find no further difficulty in making a commercial success. Probably this material was deposited as a volcanic tuff and since the writer has observed white tuffs at other points it may be that similar material will be discovered elsewhere in the county.

East of Warner there is a deposit of ochre which as yet has been but slightly prospected. F. B. Hahn, formerly of 1850 North Main street, Los Angeles, is the owner.

GEMS.

The gem minerals of California have been described at great length in Bulletin 37 of the State Mining Bureau, by Dr. George F. Kunz, of New York City, whose long experience and commanding position in the gem trade of America have given him exceptional opportunities for knowing of the material produced and judging of its quality. In that bulletin is much invaluable, historic and descriptive detail relating to gems mined in San Diego County, which can not here be repeated. Since this most valuable bulletin is still for sale, those wishing minute detail regarding the occurrence and character of the gems are referred to it for more complete information. The purpose of this article is to concisely review the subject and supply all details which have become current since 1905, when Bulletin 37 was issued, together with some facts hitherto omitted. Also, the geology of the deposits more fully discussed and the relation and position of the principal mines are defined more accurately than heretofore, since in Bulletin 37 some of the section numbers are incorrect.

The gem industry of this county has at times attained considerable prominence though at present much depressed. At the time of the writer's visit none of the gem mines were in operation. This is partly due to a decline in the demand for San Diego County gems. For a long time there was an active demand by Chinese merchants for the red tourmaline which is highly prized in their country, and this served as an outlet for the material of medium quality so that the finest specimens of gem quality could be used for local consumption in the tourist trade, or sent to the New York market. With the death of the Dowager Empress of China and the outbreak of the revolution in that country the demand for such luxuries was suspended and at present, there being no market for medium quality tourmalines, it hardly pays to work the mines. Good specimens of kunzite find a ready sale, but the principal source of this material, the Pala Chief mine, has not been recently in operation. The other gems, while very beautiful, are not now in sufficient demand to create an active market.

The list of San Diego County gems and gem minerals is large and interesting and comprises 17 species which may logically be arranged in two groups, (A) those of commercial interest and (B) those not yet commercially important.

(A) GEM MINERALS OF COMMERCIAL INTEREST.

Name	Localities
Topaz	Ramona.
Spinel	Rincon.
Beryl	Pala; Mesa Grande; Ramona; Aguanga Mountain; Jacumba.
Garnet	Ramona; Cajon Mountain; near San Vicente; northeast of Jacumba.
Tourmaline	Pala; Moosa Canyon; Mesa Grande; Aguanga Mountain.
Spodumene (Kunzite)	Pala.

It should be noted that fine specimens of these minerals are in demand for mineralogical collections in museums as well as for gems, and in this way possess commercial interest apart from their value to the lapidary. Further they are not only commercially important, but also in this county they all occur in pegmatite dikes and therefore, in their geologic relations, must be discussed together. For a minute description of the gems found in the San Diego mines the reader is referred to Bulletin 37, for Dr. Kunz having had the opportunity of seeing all the best material, his descriptions are detailed and authoritative. For this report a condensed summary must suffice but in several cases the writer has freely used Dr. Kunz's statements.

Topaz: Bull. 37, pp. 46–47.

Silico-fluoride of alumina.

H. 8; G. 3.4–3.6. Brittle, luster vitreous. Color yellow to brown and pale green to blue, often colorless.

The chief locality in this county is Ramona, where in the Little 3 and Surprise mines were found crystals varying in color from white, light yellow and sea green to sky blue. Some of these were over a pound in weight.

Spinel: Bull. 37, p. 47.

Aluminate of magnesia, often with iron oxide.

H. 8, G. 3.52–4.1.

Color usually various shades of red. At Rincon, in the Mack mine, blue crystals of small size have been found.

Beryl: Bull. 37, pp. 48–50.

Silicate of alumina and glucina.

H. 7, 5–8, G. 2.7.

Luster vitreous. Color green, yellow and white to rose red.

The more familiar forms of this mineral are the rich green gem known as emerald and the sky blue and sea green stone called aquamarine.

In San Diego County rose colored beryls have been found in the Himalaya mine at Mesa Grande and on Aguanga Mountain. The principal specimen from the latter weighs nearly 2 pounds and is in the United States National Museum. Other beryls of pink color have been found in the Katrina Mine at Pala; in the Esmeralda mine at Mesa

Grande, together with golden beryl and aquamarine; both pink and green shades at the Crystal Gem mine, 8 miles northwest of Jacumba, and in the Surprise and A B C mines at Ramona. Golden beryl has been found 1 mile northwest of Jacumba. Other beryls are reported from the Hercules and Lookout mines at Ramona and the Mack mine near Rincon has produced very beautiful aquamarines.

Garnet: Bull. 37. pp. 50–54.

Silicate of alumina, lime, magnesia, iron, manganese, chromium, or titanium.

H. 6.5. G. 3.15–4.3.

According to composition they are mineralogically classed as follows:

Alumina Garnet	Alumina-iron, *Almandite,* cherry red to deep red. Alumina-manganese, *Spessartite,* red brown and orange red. Alumina-lime, *Grossularite,* var. essonite, white, yellow, brown to red Alumina-magnesia, *Pyrope,* blood red to black.
Iron Garnet	Iron-lime, *Andradite,* yellow or orange brown.
Chromium Garnet	Chromium-lime, *Ouvarovite,* emerald green.

By jewelers these stones are classed more by color than by chemical composition. Essonite has been found in limestone at several points 9 to 10 miles northeast of Jacumba, also near San Vicente. The finest crystals have been found at Ramona in the Hercules, Lookout, Surprise and Prospect mines. From some of these, gems have been cut up to 6 and 8 carats weight.

Tourmaline: Bull. 37, pp. 54–63.

Silicate of alumina, magnesia, iron, boron and alkalies (soda, potash, lithia) with small amounts of water and fluorine.

H. 7–7.5. G. 3–3.2.

Brittle, luster vitreous. Colors, black, blue, green, yellow, red, brown, colorless. The red or pink variety, called rubellite, is highly prized by the Chinese.

Gem tourmalines were first found in this county at Mesa Grande about 1895. The rubellite in lepidolite at Pala was first reported in 1890. Mesa Grande has yielded perhaps the largest number of fine crystals. The two-color stones, red and green, are especially fine. Dr. Kunz estimates that $30,000 worth of mineralogical specimens have been obtained here and that the gems aggregate up to 1905, some $200,000. The Pala Chief mine and the Hiriart Mountain claims have also yielded much valuable material.

Spodumene: (var. Kunzite) Bull. 37, pp. 81–93.

Silicate of alumina and lithia, usually with a little sodium.

H. 7–7.5. G. 3.19. Brittle, luster vitreous, on cleavage surfaces pearly. Lamellar structure parallel to vertical axis.

This handsome lilac and pale pink to white spodumene discovered in 1902 and found only at Pala in this county, and at the Fano mine near Coahuila in Riverside County, has become of world-wide interest. The darker stones are especially beautiful but are said to fade slightly after long exposure to light. The Pala Chief and White Queen mines at Pala are the chief sources, but the former has yielded the largest masses. Some very large specimens have been found weighing up to 24 ounces.

THE PEGMATITE DIKES AND THE GEM VEINS.

It has long been known that in San Diego and Riverside counties the principal sources of tourmaline, kunzite and garnet, together with the less abundant beryl, topaz and spinel, are pegmatite dikes of large size and substantial extent, often occurring in diorite or gabbro.

Pegmatite is a granitic rock consisting of quartz and feldspar together with mica which, in a fluid state, has been injected into fissures in some other rock, under conditions which have permitted its material to cool slowly and its constituent minerals to crystallize and develop freely and fully and therefore to form large masses.

In all the gem-bearing dikes the outer zone or marginal portion at both sides is a micaless granite or aplite, a granular mixture of quartz and feldspar of moderately fine grain, owing its texture and condition to the more rapid cooling of the material at its contact with the country rock. Within a second zone, where cooling was more gradual, the feldspar and quartz appear in larger masses, and other minerals show themselves. Generally the first foreign mineral to appear is black tourmaline in its characteristic long prisms, usually imbedded in quartz. Garnet crystals, of small dimensions, are often visible, which through their higher gravity, when the dike lies nearly flat, gather in its lower portion, forming lines or bands and giving rise to the name of ''Line rock.'' Graphic granite, a massive development of feldspar with angular quartz inclusions, also abounds in the second zone. The third or central zone is more irregular in the arrangement of its minerals and contains cavities of substantial size, bordered by and containing large crystals of quartz and feldspar. Filling these cavities in the Stewart vein at Pala are found the lithia minerals, lepidolite and amblygonite, and in the gem-bearing veins are found tourmaline; spodumene, var. kunzite; beryl, topaz and garnet; for the most part enclosed in a clay-like substance* which fills the cavities.

On account of these details of interior structure some observers have described the whole dike as a vein, but the conditions are clearly more complex. Through movements of the earth's crust, which resulted in the opening of wide fissures, the pegmatite dike material found its way toward the surface, but the fissures remained planes of movement and after the central portion of the dike had fully cooled and hardened, or perhaps even before, it was shattered and a new fissure opened through which gem forming mineral solutions might pass. Thus within the dike was formed a vein. In several of these dikes are undoubted fissures and gouges, particularly in the Tourmaline Queen, and there is evidence to confirm the view that the shoot-like cavities in which the gems occur, are portions of fault fissures within the dikes. It is true, all of the gems are not free in the clay, for some are locked or "frozen" into crystals of quartz. This, however, is unquestionably due to silicious solutions which flowed up through the secondary fissures and formed the quartz crystals which abound in them.

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*W. T. Schaller, Am. Jour. Sci., Vol. XVII, p. 191.

The persistent recurrence over a large area of similar phenomena in connection with these dikes is, indeed, striking. First came an intrusion of granite diorite or gabbro and later an injection of pegmatite into its fissures. Then occurred a secondary fissuring of the pegmatite and a flow of solutions depositing usually tourmaline and sometimes also beryl, kunzite, topaz, or garnet, together with quartz crystals. On the central axis mentioned below lithia minerals everywhere occur.

Such are the dikes which contain the gem bearing veins. Their chief localities are Pala, Rincon, Mesa Grande, Moosa Canyon, Ramona and Aguanga Mountain.

By referring to the accompanying economic map on which the gem and lepidolite deposits have been plotted, it will be seen that Pala, Rincon and Mesa Grande lie in a line which bears about north 50° west and therefore coincides in general direction with the axis of the granite ranges and the strike of the metamorphic rocks. These gem deposits and the lepidolite deposit on Granite Mountain southeast of Banner, are on a central axis, Ramona and the Moosa Canyon locality lie in a parallel line about 8 miles southwest, and Aguanga Mountain is about the same distance northeast. The Pala dikes are mostly in diorite, as are those of Aguanga Mountain and Rincon, those at Mesa Grande are in gabbro and the others are in granite. Many conclusions might be drawn which would require further field work to confirm them, but the repeated occurrence of the lithia minerals, kunzite and lepidolite, in a gem-bearing zone 40 miles long, is highly interesting. The Riverside County kunzite locality near Coahuila lies some 23 miles northeast of the San Diego zone.

THE GEM DEPOSITS.

Pala.

Pala is a small village on the Indian Reservation of that name, in the valley of San Luis Rey River, about 28 miles from Oceanside. It takes its name from the Franciscan mission chapel of San Antonio de Pala. The gem bearing dikes here occur in three hills, or small mountains, immediately north and east from Pala village, rising 1,000 feet or more above the plain of the San Luis Rey River and lying within Secs. 13, 14, 15, 22, 23, 24 and 25, T. 9 S., R. 1 W., S. B. M. The dikes are of exceptional size and penetrate a country rock of granite and diorite. In several cases, erosion has removed the country rock above the dike or, in miner's parlance, the ''hanging wall,'' so that the dike itself, for some distance, forms the surface of the mountain slope and is described by miners as a ''blanket vein.''

The westernmost hill, 1,800 feet high, called Tourmaline Queen mountain,[1] is cut by 4 approximately parallel dikes of slight southwesterly dip, the 3 lower being nearly horizontal in their intersection with the east face of the mountain. The lowest is of small thickness and minor importance, being known as the Douglass vein, from the Douglass claim located upon it. The next in altitude, on which are the Stewart and Mission claims of the American Lithia and Chemical Company, is about 400 feet above the arroyo bottom. This is exposed for a distance of 3,000 feet or more on the east side of the mountain, and its line of outcrops has a southward pitch of 5° from the horizontal. The chief feature of this dike, which is 40 feet or more in width, is a vein of lepidolite 10 to 20 feet thick, lying along the central plane. In the upper portion of this, at intervals, have been found pockets of amblygonite or lithia phosphate. The red tourmaline, rubellite, abounds imbedded in the lepidolite, in radiating masses. No abundance of gems has been found in this vein, but light pink kunzite and some gem tour-

Tourmaline Queen Mountain and Pala Chief Mountain. Looking Northeast from Pala. F.J.H.M. Photo.

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[1] Incorrectly called Pala Mt. in Bull. 37. Pala Mt. lies SE. and has no gem bearing dikes or veins.

maline have been taken from the north end of the Stewart claim and considerable quantities of small but fine green tourmalines have been taken from the Gem lepidolite mine, belonging to A. M. Labaugh, which adjoins the Stewart claim on the north. South of the Stewart is the Mission claim, on the south face of the hill and, on patented land still farther south, is the old Alvarado mine.

About 600 feet above the Lithia Company's dike and parallel to it, is the Tourmaline Queen dike. Its outcrop is hundreds of feet in length, its extent to the south having been limited by the erosion of the hill. The claim which bears this name is partly in Sec. 15 and partly in Sec. 22. The workings on it are quite extensive. This dike is about 14 feet wide and dips southwest 15°. On this mountain are also the Pala King and Homestake claims.

Tourmaline Queen Mine. Looking West from Pala Chief. F.J.H.M. Photo.

Dr. Eakle determines the country rock of the Tourmaline Queen as hornblende-diorite. A thin section shows large broad plates of dark green hornblende and plagioclase feldspar as essentially composing the rock. Smaller amounts of orthoclase and some irregular grains of magnetite are present.

Still higher, on the Tourmaline Queen Mountain is the Tourmaline King mine, belonging to F. B. Schuyler, of Berkeley, Cal. The outcrop is on the north face of the summit peak, the vein being about 7 feet wide and dipping 40° southwest. Other minor claims on the south face of this mountain are Maud and Happy Hooligan, also Buster Brown, formerly White Cloud, belonging to John Reed, of Fallbrook, and Adolph Shoulders, of Pala.

Pala Chief dike is the largest of all the gem bearing pegmatites. As the photograph shows, it is exposed on the west side of the summit of a hill, about 1,500 feet in height. It is about 1 mile east of Tourmaline Queen and lies mainly in the SE. ½ of Sec. 14. Its thickness seems to vary from 30 to 50 feet and it dips about 15° west. The hanging wall appears to be a mica diorite and the foot wall a granite, but over a considerable area the hanging wall has been removed by erosion so that it has been called a "blanket vein." The gem material, chiefly kunzite, occurs in a reddish clay in pockets of considerable size. One of these was 3½ feet high and 20 feet long. Lepidolite in small masses is of frequent occurrence.

Pala Chief Mine and Hiriart Mountain. Looking Eastward from Tourmaline Queen Mountain. F.J.H.M. Photo.

The following are Dr. Eakle's determinations of the wall rocks:

Hanging-wall, dark hornblende-diorite. A thin section shows the rock to consist almost wholly of plagioclase feldspar and fibrous green hornblende. Magnetite occurs scattered throughout.

Foot wall, biotite-granite. A disintegrated granitic rock. A thin section shows biotite flakes, little plagioclase, considerable orthoclase and small amounts of quartz and hornblende. An occasional titanite crystal is seen.

The Pala Chief claim is one of a group of 5, the others being Ocean View, Goddess, Hazel W. and Knickerbocker. This group, together with the Tourmaline Queen, Pala King and Homestake, is controlled by the Pala Chief Gem Mining Company, of San Diego, Frank A. Salmons, president; R. Fenton, secretary.

South of the Knickerbocker claim is the Olla, owned by John Reed and Adolph Shoulders. South of Olla is Butterfly, owned by T. A. Blakely, of San Bernardino. This has produced some pink kunzite.

Pala Chief Dike and Mine, Looking East. F.J.H.M. Photo.

West of Hazel W. lies Redlands King, belonging to Mascart, of Redlands. East of Knickerbocker and Olla and south of Goddess is Redwings, belonging to B. T. Cooper, of Pala. This claim has yielded aquamarine beryls of inferior quality.

Hiriart Mountain. This hill, about 1,700 feet high, lies about 1½ miles southeast of Pala Chief, mainly in the SE. ¼ of Sec. 24, T. 9 S., R. 2 W., extending into Sec. 25. Here are numerous pegmatite

Mammoth Quartz Crystals. Pala Chief Mine.

dikes, varying in direction and dip, as shown in the photograph. The claims located on these are in 3 groups, based on ownership.

(A) Domingo Hiriart, Pala.
    San Pedro.
    Senpa.
    Anita.
(B) M. M. Sickler, Pala.
    K. G. Naylor.
    Vanderberg.
    White Queen.
    Center Drive.
    Fargo.
    El Molino.
    Hiriart.
(C) M. M. Sickler and D. Hiriart, Pala.
    Katrina.

The White Queen claim is of historic interest as being the source, in 1902, of the first specimens of Kunzite discovered. This material was sent to Dr. G. F. Kunz, in New York, who identified it as Spodumene and subsequently it was given the variety name of Kunzite by Professor Charles Baskerville.

RINCON.

Bull. 37, pp. 137–39.

Gems have been found on the east side of the Rincon Indian Reservation between Pala and Mesa Grande, about 9 miles southeast of the former place. At this point the chief deposit was opened by J. W. Mack and is known as the Mack mine. It lies in Sec. 25, T. 10 S., R. 1 W. The dike is described as 5 to 6 feet wide with granite footwall and diorite hanging wall. The chief product was beryl of various colors, some of it deep blue. No work has been done here for some years, probably because the pocket became exhausted and the demand was not sufficiently great to justify much expenditure in searching for a new ore.

MESA GRANDE MINES.

Bull. 37, pp. 133–35.

The gem deposits of Mesa Grande lie about $1\frac{1}{2}$ miles northwest of the Indian Rancheria. The principal properties are those formerly operated by the San Diego Tourmaline Mining Company and the Himalaya Mining Company. The latter control the SE. $\frac{1}{4}$ of SW. $\frac{1}{4}$ of Sec. 17, T. 11 S., R. 2 E. The holdings of the former are the NE. $\frac{1}{4}$ of NW. $\frac{1}{4}$ and NW. $\frac{1}{4}$ of NE. $\frac{1}{4}$ of Sec. 20, in the same township and range.

These properties, which adjoin one another, are both on the same fissure, which has been filled with an extensive pegmatite dike. This traverses the two properties, with a serpentine course, in a northwesterly direction for a distance of half a mile, the country rock being a dark green gabbro. The width of the dike varies considerably. At times its width is somewhat less than that of the drifts which have been cut in it and at times it is greater. The average might be stated at 4 feet. At the contacts on either side, the dike matter is a fine grained aplite but, in the center it is a coarse pegmatite, with frequent cavities, pockets and shoots in which the more perfect specimens of tourmaline and other gem material occur, imbedded in clay.

Dr. A. S. Eakle determines the country rock here to be a hypersthene-gabbro. A thin section shows the rock to mainly consist of labradorite feldspar and rounded crystals and plates of hypersthene with a sprinkling of magnetite. The hypersthene is pale red and shows pleochroism, pale red to pale green.

On the San Diego property the dike winds considerably in its course, and, at the south end of the property, has divided into two diverging forks or spurs. These have not yet been explored as far as the south boundary of the property, and have not been opened on the adjoining claim southward. In the beginning, throughout the two properties, the work was done by open cuts in which the gem bearing mass was mined for a depth of some 20 feet. After this had progressed to a certain point, it was found too expensive to prevent the sides of the open cuts from caving in. This work was, therefore, abandoned and further exploitation of the deposit was made by entering the dike at a lower level and working underground. On the San Diego property two cross cut tunnels were driven, the more southerly of which is over 200 feet long and cuts the two spurs above described. On this property the present level is about 200 feet vertically below the surface of the ground. The ground slopes northward until, on the Himalaya claim, the surface intersects the vein at the adit level. On the latter the main working is by an adit on the north outcrop of the vein, which has been mined for about half the length of the property.

At the present time both properties have been idle for some time. The San Diego tunnel has caved in and access is not at present possible. The Himalaya property is locked up and not open to visitors. The San Diego Tourmaline Mining Company's interests are now represented by K. G. Naylor of San Diego. The Himalaya Company is undergoing reorganization and a letter to the New York address brought no reply.

ESMERALDA MINE.

Bull. 37, pp. 136–37.

About $1\frac{1}{2}$ miles west of the Himalaya property and in the east edge of SE. $\frac{1}{4}$ of SE. $\frac{1}{4}$ of Sec. 13, T. 11 S., R. 1 E., is the gem mine known as Esmeralda. This property is owned by the Native Gem Mining Company, the controlling interest being held by Dr. C. C. Vallé, Walter N. Burnell, and Mrs. Nicholson, all of San Diego.

Here is a wide dike nearly vertical, and about north and south in its trend, but, a few feet below the surface, branching upward to east and west. The workings are below the fork.

As described in Bulletin 37, this mine at one time produced some very interesting gem material, but it has long been idle and the portals of its adits have caved in. The gems are said to have occurred in pockets of large size but these pockets were somewhat far apart.

MOOSA CANYON.

Bull. 37, p. 62.

The locality is about 12 miles southwest of Pala and 3 or 4 miles southeast of Bonsall. In Bulletin 37, its position is stated to be in Sec. 26, T. 10 S., R. 3 W. The writer was unable to verify this, as one of the owners, Mr. T. A. Freeman, who was interviewed at Bonsall, declined to give any information about the position of the property. Later information, undoubtedly reliable, gives the location of this deposit as in the east half of section 27 of the same township and range.

There are said to be two claims, Vista Chief and Mountain Belle. Tourmalines have been found here, but not in large quantity. The reported occurrence of Kunzite here could not be verified. It is said that tourmalines have been found in Gopher Canyon, which lies 2 miles southwest of Moosa Canyon.

RAMONA.

Bull. 37, pp. 140–150.

The gem deposits here are noteworthy in that the dikes all occur in granite instead of in diorite or gabbro. No mining has been done here for some years, though in assessment work on unpatented claims some gems are produced.

The claims lie in T. 13 S., R. 2 E., on one mineral zone, which includes several dikes, and nearly all are in Sec. 8.

List of Ramona Gem Claims.

Name	Position	Owner	Address
29 Prospect	SE. ¼ SE. ¼ Sec. 6	H. A. Warnock; John P. Sutherland	Ramona.
30 A. B. C.	Pat. NW. ¼ NW. ¼ Sec. 8	Alexander McIntosh	Ramona.
31 Hercules Group	8 claims, Sec. 8	Dr. E. G. Logan; A. W. Pray	Escondido.
32 Little Three	Pat. NE. ¼ SE. ¼ Sec. 8	Dan McIntosh	Ramona.
		H. W. Robb; Peter Schnack	Escondido.
33 Cable	SE. ¼ NE. ¼ Sec. 8	Dr. Cable	Los Angeles.
Sunrise	NW. ¼ SE. ¼ Sec. 8	— Batcheller	Ramona.
Surprise	SW. ¼ SW. ¼ Sec. 9	J. E. Farley; Mrs. G. M. Stone	Ramona.

AGUANGA MOUNTAIN.

Bull. 37, pp. 123–24.

At present only one mine is being worked here. It is the Mountain Lily, 6 miles southeast of Oak Grove, located by Bert Simmons, owned by Dr. C. C. Vallé, of San Diego, and operated under lease by J. W.

Ware & Co., 1414 F street, San Diego. The dike is described as about 4 feet wide in diorite, the gem bearing vein being on the contact between the pegmatite and the hanging wall of diorite.

The special product at this time is a "Nile Green" tourmaline. These stones are very attractive in color but mostly small, not averaging much more than one carat, when cut. Fluorite in small quantity has been found here.

JACUMBA.

Bull. 37, p. 150.

Nine and a half miles east of Jacumba, near Mountain Springs, are some deposits of essonite garnet in crystalline limestone associated with gneiss. Some fine gems have been mined here under the name of California hyacinth. The San Diego Gem Company formerly held claims here, but they have lapsed.

Eight and a half miles northwest of Jacumba is the Crystal Gem mine. Here, in a pegmatite dike, have been found pink and green beryl and essonite garnet. Some 40 miles north of Jacumba, near Seventeen Palms, fine garnets have been reported as abundant.

(B) GEM MINERALS NOT YET COMMERCIALLY IMPORTANT.

The following minerals, while of interest as gems, are insufficiently abundant to be of commercial interest or, while occurring in gem quality elsewhere, are not known in this condition in San Diego County:

Corundum. Aluminium oxide. Bull. 37, p. 45.

H. 9, G. 3.9–4.1. Luster adamantine to vitreous. Colors all prismatic hues to colorless.

The common varieties of this mineral are used as abrasives under the name emery. Transparent corundum ranks among the most valuable of gems and includes the ruby and sapphire. Ruby is red corundum. Sapphire includes all colors except red, but the name is more particularly applied to the blue colors. Mr. W. H. Trenchard reports light pink corundum from a locality 26 miles east of San Diego, on the north slope of Mt. San Miguel, 8 miles northeast of Sweetwater Dam, where it occurs in hydromica schist associated with garnet. He also reports bluish corundum from Tule Mountain north of Jacumba.

Dumortierite, Basic aluminium silicate, Bull. 37, p. 71.

H. 7. G. 3.265.

Five miles northeast of Dehesa and 1 mile south of Alpine Heights, on the line between Secs. 4 and 5, T. 16 S., R. 2 E., is a large body of quartz, enclosing crystals of dumortierite. When cut and polished this makes handsome specimens and would be available for ornamental work. Thus far no commercial use has been made of this material.

Graphic Granite. Bull. 37, p. 79.

This material consists of large masses of feldspar, in which are angular individuals of quartz, resembling Hebrew letters. It appears in the pegmatite veins at Mesa Grande, Pala and elsewhere. When sufficiently solid and susceptible of polish it is available for ornamental work, boxes, vases, etc.

Labradorite. Lime—soda feldspar. Bull. 37, p. 80.

H. 6. G. 2.27. Colors, gray, brown, greenish.

The cleavable varieties show on their striated surfaces a beautiful play of colors like those of mother of pearl, caused by the phenomena of color interference. This mineral is reported from the gem mines but does not occur in especially good size or quality.

Vesuvianite. A Calcium-Aluminium Silicate. Bull. 37, p. 93.

H. 6.5. G. 3.35–3.45. Color brown to green.

This mineral in gem quality, is reported by W. H. Trenchard from Jacumba and San Vicente.

Axinite. A silicate of alumina, calcium and manganese, with some iron, and magnesia and also boric acid and water. Bull. 37, p. 96. Color, clove brown, plum blue, violet, pearl gray, honey yellow and greenish yellow.

In 1904 a discovery of this mineral was reported near Bonsall, 12 miles southwest of Pala, by Thos. A. Freeman. This was at the Moosa Canyon tourmaline locality.

Lazulite. Aluminium phosphate, with some magnesia and water.

H. 5.6. G.3. Color azure blue. Bull. 37, p. 98.

A specimen of this mineral was reported from the vicinity of Oceanside in 1893. State Mining Bureau Museum No. 13591. As there are no crystalline rock outcrops near Oceanside, this may have been drift or float material.

Epidote. Silicate of alumina, iron and lime, with some water. Color yellow-green, pistachio-green to red-gray and colorless. Bull. 37, p. 99.

H. 6–7. G. 3.2–5.

Found in clear transparent crystals at the McFall mine, 7½ miles southeast of Ramona. These were handsome crystals of gem quality.

Lepidolite. Lithia mica; Silicate of alumina and lithia with flourine and water. Bull. 37, p. 100.

H. 2.5–5. G. 2.84–3. Luster pearly. Color rose red, violet gray, lilac, yellowish, grayish, white, translucent. In rhombic crystals or granular massive.

The massive variety is used to some extent for ornaments such as ash trays, dishes, vases and paper weights. The chief deposit in this county is at Pala, in the Stewart vein.* In small quantities it occurs in all the veins at Pala and at Mesa Grande and at the Royal mine, southeast of Banner.

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*(See Lithia Minerals, this Report, p. 76).

Chrysocolla. Hydrous copper silicate. Bull. 37, p. 101.

H. 2–4. G. 2–2.2. Color, various shades of green.

When occurring in masses of sufficient size, this mineral is cut for table tops and similar decorative purposes. In small masses it is used to some extent for jewelry. One specimen is in the State Mining Bureau Museum, locality not given. No. 7187.

Apatite. Calcium fluophosphate with some chlorine. Bull. 37, p. 102.

H. 5. G. 3.17–3.23. Color green to blue. Occasionally yellow, brown, red or gray.

Reported from Dos Cabezas mine, near Jacumba.

Fluorite. Calcium fluoride. Bull. 37, p. 102.

H. 4. G. 3.18. Luster vitreous. Color varied. White, yellow, green, blue, violet, crimson, rose, pink and brown.

This mineral, though rather soft, is often cut into paper weights, vases and other ornamental articles. It has been reported from the Mountain Lily mine on Aguanga Mountain.

Gold Quartz.

Bull. 37, pp. 68–9.

Auriferous quartz in which the gold occurs in conspicuous filaments and masses has long been used in certain forms of jewelry, such as brooches, links for watch chains, inlaying watch cases, etc. In the bonanza days of gold mining in this county, much of this material was found at mines near Julian, the Ready Relief in particular being quite productive.

ABRASIVES.

Under this head are properly included corundum or emery, quartz and garnet. The first, reported from the north side of Mt. San Miguel, is not in commercial quantities. Quartz, which is extensively used in the manufacture of sand paper, is found at many points in San Diego County, but there is not yet evidence of a sufficiently large market to justify the establishment of a factory and the material is not valuable enough to stand the expense of much transportation.

Garnet, which is used in making sandpaper for finishing wood and leather, is found in substantial quantity at the McFall mine, owned by John McFall, of Ramona, 7½ miles southeast of Ramona, on the east of the San Vicente Grant, SE. ¼ of Sec. 17, T. 13 S., R. 2. E. Here a shaft has been sunk 22 feet in solid garnet, which occurs in pockets in diorite.

Another deposit of massive garnet is in Sec. 25, T. 13 S., R. 8 E. Claims have been located on this by Bert Simmons, of El Cajon, and Homer Bailey, of San Diego.

Near Dos Cabezas Springs and within 1 mile of the San Diego and Arizona Railroad survey are a number of deposits of garnet suitable for abrasive purposes.

LITHIA MINERALS.

Bulletin 38, pages 306-10.

Lithia is used in commerce for medicinal purposes, in artificial mineral waters and in tablets. On account of its red flame the nitrate is used in making red fire.

This substance occurs in several minerals, the principal ones being lepidolite, amblygonite and spodumene. The first occurs in commercial quantities at Pala and in smaller amount at many points. The second occurs also at Pala, in small quantities, associated with the first. A rare variety of spodumene, called kunzite, also occurs at the same locality but as a gem mineral and not as a source of lithia.

Lepidolite, lithia mica, has a complex composition. The general formula given by Dana is $KLi[Al(OH,F)_2]Al(SiO_3)_3$. Analyses of specimens from different localities, show percentages of lithia ranging from 3.87 to 5.88. It occurs usually in scaly, granular masses, sometimes in aggregates of short six-sided prisims. The cleavage is basal, luster pearly, and the color rose-red, violet-gray and yellowish, or grayish white to white. Its hardness is 2.5 to 4, its specific gravity 2.8 to 2.9. It fuses easily to gray or white glass and colors the blow pipe flame red. It is distinguished from other micas by its fusibility by the red flame and by the reaction for fluorine.

Amblygonite is a fluophosphate of lithia and alumina, containing 10 per cent of lithia. It crystallizes in large coarse crystals in the triclinic system. Its hardness is 6, its specific gravity 3.01 to 3.09. The color is white to pale greenish, bluish, yellowish or brownish white. The Pala material is almost entirely white and to the eye closely resembles a feldspar, but it fuses easily in the blowpipe flame and tinges the latter red. Should the mineral be found in commercial quantity, it will be more valuable than the preceding, since it contains a larger percentage of lithia and the phosphoric acid is valuable as a by-product.

Spodumene, var. Kunzite, is a lithia alumina silicate, containing 8.4 per cent of lithia. It is found at Pala, but is not a commercial form of lithia. Its characters are given under the head of Gems.

As already stated under that head, these lithia minerals occur in San Diego County, on a northwesterly trending axis, parallel to the strike of the granite ranges and extending from the old Royal mine, southeast of Banner, through Mesa Grande to Pala.

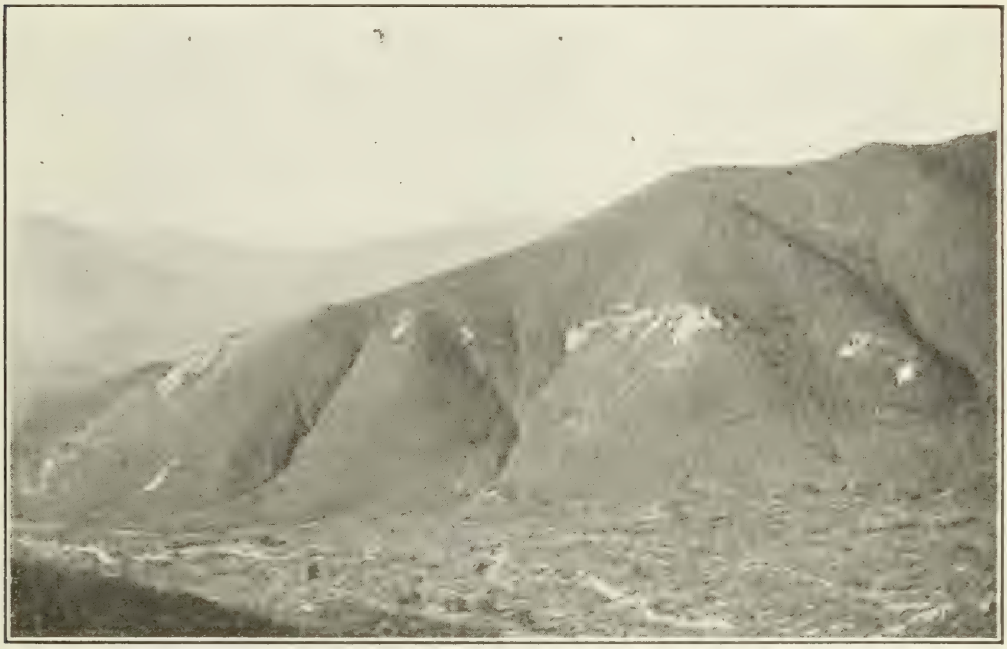
The Royal mine lies southeast of Banner on the southwest slope of Granite Mountain, in Sec. 18, T. 13 S., R. 5 E. Lepidolite occurs here in a pegmatite dike and, from all accounts, the quantity is quite limited.

The property, which has never been productive, is said to belong to Henry Blumenberg, Jr., of Los Angeles.

At Mesa Grande, lepidolite occurs in small masses, in the gem bearing veins on the San Diego, Himalaya, and Esmeralda properties. Commercially the quantities are insignificant. The Rincon locality is on the Pala axis, but lithia minerals have not been reported.

This widespread and persistent lithia mineralization culminates at Pala, where are the commercially important deposits of lepidolite and also those of the gem mineral kunzite.

Here as shown in the photograph on the east side of Tourmaline Queen Mountain, about 400 feet above the base, is exposed a great pegmatite dike 35 to 45 feet wide, and nearly horizontal in its main outcrop, which strikes about north 7° east and dips to the south about 5°. Westward the dike dips 10° to 15°. It is exposed for a length of 3,000 feet or more, from north to south, and has been opened at several points. Filling a fissure in this dike, somewhat below its central plane, is a vein of lepidolite from 15 to 20 feet thick. Throughout the lepidolite, radiating masses of rubellite or pink tourmaline occur abundantly and in occasional pockets are masses of amblygonite. As stated, the wider portion of the dike is above the lepidolite and the amblygonite, when found, was mostly in the lower part of the pegmatite above the lepidolite. About 30 tons of amblygonite were shipped from this mine and it is not known whether any substantial quantities remain. It was found mostly west of the ridge under which the dike passes. From each face of the hill, a tunnel was driven and, as they did not quite coincide



Stewart Lithia Vein. Looking West from Pala Chief. F.J.H.M. Photo.

in level, they were connected by a short winze. The lepidolite was chiefly mined from the east tunnel and the ambylgonite from the west.

The principal portion of the lithia vein is controlled by the American Lithia and Chemical Company, 206 Broadway, New York City; Wm. N. Crane, president; Theo. Ludlum, secretary. This company owns the claims known as Mission and Stewart. Adjoining the latter to the north, is the Gem Lepidolite Mine, belonging to A. M. Labaugh, of Pala. The American Lithia and Chemical Company also owns a half interest in the Douglas claim on the small vein at the foot of the hill. The remaining interest is held by T. A. Blakeley, of San Bernardino.

While this Pala lepidolite deposit is of great size, its tonnage having been estimated at from 500,000 to 1,500,000 tons, the writer is informed that only 5 cars of 30 tons each have been shipped from the property, but there are said to be over 1,000 tons of ore on the dump and this has been reported under the head of production. Its distance of 28 miles from railroad, at Oceanside, should not add more than $4.00 a ton to the cost of production, and it is greatly to be hoped that an adequate market will soon be found.

Small masses of lepidolite are found in the veins of the Tourmaline Queen and Tourmaline King mines, on the same mountain. In the Pala Chief vein also, the lithia mica occurs in small quantities. It is also found in the gem bearing veins on Hiriart Mountain, but not in substantial tonnage.

PETROLEUM.

Petroleum of commercial interest has not yet been discovered in this county, although several wells have been and are being drilled and the operators of these seem quite hopeful of success. In several wells small amounts of gas have been encountered and occasional layers of sandy material, with suggestions of oil, have raised the hopes of the driller, but nowhere has oil been found in measurable quantity.

It is of interest to note that the middle Miocene beds which are the chief reservoirs of oil in the San Joaquin Valley and in Orange County, have not been identified in the county of San Diego, and the deepest wells in the latter have passed through all the Tertiary beds and the Cretaceous strata and have penetrated a black shale, sometimes calcareous, which is probably of Jurassic age. It is evident, therefore, that, if oil be found, it must occur in beds of different geologic horizon from those constituting the commercial oil reservoirs to the northward.* It would, perhaps, be unwise to say that it is impossible for oil in commercial quantities to be found in other horizons, in southern California but, thus far, we have no information that will justify the expectation that, in this region, it can be found in older strata than those yielding oil farther north.

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*See Ralph Arnold, Bulletin Am. Inst. Min. Eng. March, 1914, pp. 406-11.

The chief encouragement to drill for oil in western San Diego County is stated to be the frequent occurrence, on the beaches, of masses of asphaltic residue or brea. The assumption is, that this material has come from submarine seepages and, from this idea, has sprung the hope that by drilling near the coast it might be possible to reach oil sands from which the inferential seepages may have come. In order to determine what evidence of seepage there might be in the waters near the San Diego coast line, a letter was addressed to Dr. Wm. E. Ritter, director of the Biological Station, near La Jolla, asking whether he knew of any submarine seepages. His reply is given herewith:

THE SCRIPPS INSTITUTION FOR BIOLOGICAL RESEARCH OF THE UNIVERSITY OF CALIFORNIA.

LA JOLLA, CALIFORNIA, November 18, 1913.

Mr. F. J. H. Merrill, Oceanside, Calif.

DEAR SIR: Replying to your letter of inquiry about petroleum in the ocean in this vicinity, I would say that we have seen no signs of it south of Redondo. It may be further stated, that our explorations of the sea over most of the continental shelf in this locality have been so extensive that, did outflows comparable with those in the Santa Barbara Channel exist here, they could hardly have escaped our notice.

Small fragments of asphaltum do occur, here and there, on shore rocks in many places, but I have always supposed they were brought from long distances—probably from the north.

Yours very truly,

WM. E. RITTER, Director.

In conclusion it may be said that while the search for petroleum in this region by persons with capital to spare for the investigation, is most laudable and evinces in a high degree the existence of a most cordial public spirit, it is not a matter to be undertaken by persons of limited means. As "twenty swallows do not make a summer," so a few bottles or even buckets of oil do not make a commercial oil field. The discovery here of a substantial oil field would be of incalculable value, but can not with certainty be anticipated.

Companies Drilling Oil Wells.

Lo Tengo Oil Company, 322 Timken Building, San Diego. President, A. J. Bradley; secretary, E. G. Dehm. Well one mile north of Tia Juana, NE. ¼ of NE. ¼ of SW. ¼, Sec. 31, T. 18 S., R. 1 W., 3,290 feet deep. Began 1911.

Tia Juana Valley Oil Company, 323 Timken Building, San Diego. President, A. C. Riordan; secretary, E. G. Dehm. Well 2½ miles south of Nestor. Lot 4, Sec. 9, T. 19 S., R. 2 W., 760 feet deep. Began 1910.

Otay Oil Company, American National Bank Building, San Diego. President, H. K. John; secretary, H. W. Archer. Well southeast of Otay, NE. ¼ Sec. 30, T. 18 S., R. 1 W. 2185 feet deep. Began 1910.

Balboa Oil Company, 629 Spreckels Theater Building, San Diego. President, A. J. Taylor; secretary-treasurer, John Wiseman. Well in Mission Valley, Pueblo Lot 1105, 3,352 feet deep. Began 1911.

San Elijo Oil Company, 554 McNeece Building, San Diego. President, J. McNeece; secretary, J. B. McNeece. Well southwest of Sorrento railroad station. Pueblo Lot 27, 1,700 feet deep.

Laura F. Clark Oil Company, formerly Panama-American Oil Company. President, Mrs. L. F. Clark, Encinitas. Well near La Costa. NE. $\frac{1}{4}$ of NW. $\frac{1}{4}$, Sec. 26, T. 12 S., R. 4 W. 2,265 feet deep.

Pacific Laguna Oil Company, President, A. R. Damarus, 217 Timken Building, San Diego; secretary, T. W. Dryden. Well near La Costa, SW. $\frac{1}{4}$ of SW. $\frac{1}{4}$ of Sec. 26, T. 12 S., R. 4 W. 1,400 feet deep.

The logs of the San Diego County oil wells are of much interest, but have not been kept with uniform precision and it is not easy to compare them. The drillers' descriptions are not always easy to understand geologically, but it is not difficult to note the conspicuous passage from the sands and the brownish clays of the Tertiary and Cretaceous, which we know at the surface, into gray, blue and black shales and calcareous beds, which probably belong in the Jurassic or Franciscan.

The log of the Balboa well is here given in full. That of Lo Tengo, which is also given, does not differ materially except that their surface heights being different, the changes in formation occur at different levels. These two and the Otay well appear to be the only ones which have penetrated into the hard formations below the Cretaceous.

The bottom of the San Elijo well is in the brown shale which is probably, in part, Cretaceous.

Wells of moderate depth have been drilled at Chula Vista, La Jolla and near Poway, but without finding oil.

Log of the Balboa Oil Well (1913).

Surface height, 15 feet.

	Thickness, feet	Depth, feet
Quicksand, gravel and shells	80	80
Sand and boulders	66	146
Shale blue and brown	179	325
Hard white shell lime	10	335
Water sand (artesian flow)	15	350
Shale blue and brown	150	500
Hard shell	10	510
Water sand	15	525
Shale mixed strata	175	700
Hard white shell lime	25	725
Water sand	175	900
Hot Water	100	1,000
Sand, shell and boulders	226	1,226
Sand and shale	74	1,300
Hard shell lime	25	1,325
Shale brown (clay stiff enough to stand up)	885	2,210
Hard blue lime	37	2,247
Water sand, blue shale	63	2,310
Blue black limestone gas? (new company began operations here)	100	2,410
Hard shell dark	144	2,554
Dark gray hard	5	2,559
Dark gray hard	12	2,571
Dark gray softer	4	2,575
Dark gray very hard	16	2,591
Dark gray softer	15	2,606
Dark gray hard	12	2,618
Dark gray softer	4	2,622
Light gray	15	2,637
Shell	9	2,646
Shale	4	2,650
Dark hard lime shell	22	2,672
	2	2,674
Blue shale	4	2,678
Dark hard line shell	16	2,694
Blue shale	3	2,697
Alternating shale and limestone	18	2,715
Blue lime	145	2,860
Blue shale	2	2,862
Dark blue lime	16	2,878
Hard blue lime	16	2,894
Dark blue lime	26	2,920
Light blue lime	22	2,942
Light blue lime mixed with white lime	5	2,947
Hard black slate and lime	3	2,950
Black slate	28	2,978
Blue black lime	7	2,985
Black slate	10	2,995
Gray sand rock	5	3,000

Log of the Lo Tengo Oil Well.

Surface height, 375 feet.

	Thickness, feet	Depth, feet
Sandy clay	20	---------
Sand and shale	20	40
Soft light yellow sand	200	240
Conglomerate	70	310
Hard shell	10	320
Soft red sand	37	357
Soft yellow sand	43	400
Blue shale	45	445
Soft sand and blue shale	50	495
Yellow clay	35	530
Yellow sand	42	572
Sticky clay	5	577
Blue clay	28	605
Gray sand	35	640
Blue clay	25	665
Blue clay	55	720
Blue shale	25	745
Sandy shale	50	795
Blue shale and clay	65	860
Light brown shale	505	1,365
Black sand	70	1,435
Brown shale	15	1,450
Black sand	37	1,487
Brown shale	15	1,502
Sand and conglomerate	38	1,540
Dark shale	55	1,595
Brown shale	20	1,615
Sand	15	1,630
Sticky blue clay	50	1,680
Blue shale	38	1,718
Red sand	17	1,735
Blue clay	208	1,943
Hard calcareous rock	472	2,415
Hard fine sand	40	2,455
Calcareous sand rock	27	2,582
Dark sand, gas	18	2,600
Calcareous rock	200	2,800
Conglomerate	32	32
Sand gas	13	45
Calcareous rock, gas and "oil"	20	65
Calcareous rock, soft sand and gas	85	2,900
Hard calcareous sand, "Good showing of oil"	65	65
Soft sand "oil"	20	85
Calcareous rock, soft sand layer "oil"	50	3,035
Hard calcareous rock with streaks of sand and some gas	---------	---------

The Otay well is 2,100 feet deep. It is said hard rock was encountered at 900 feet. The surface height is about 400 feet.

COAL.

Lignite seams of limited thickness and extent have been reported from borings in the vicinity of San Diego, and tradition says that some thirty years ago a bed of coal exposed at low-water mark, in the beach near Del Mar, was worked as a source of fuel for blacksmith forges.

At the present time, with oil as a cheap and abundant fuel, there is no inducement to investigate or search for these small coal beds.

GRAPHITE.

This important form of carbon is much used for making pencils, for lubricant and for crucibles for foundry facings, for stone polish and for paint. But little has been found in this county. The chief occurrence is reported from near Mason's on the road from San Felipe to Carrizo Creek. As reported by Frank Stephens, of Julian, the graphite occurs in mica shist and the deposit is in Sec. 10, T. 14 S., R. 5 E. It belongs to Mr. Stephens and Thos. L. Works, of San Diego.

Other outcrops of graphite bearing material, are known in the same region.

SALT.

Bulletin 24.

There is no source of salt in San Diego County, except the water of the Pacific Ocean, from which it has been extracted at various points on the coast by solar evaporation. At the present time there are but two plants in operation in the county, both of them near San Diego. They are operated respectively by the Western Salt Company and J. P. Duncan's Sons.

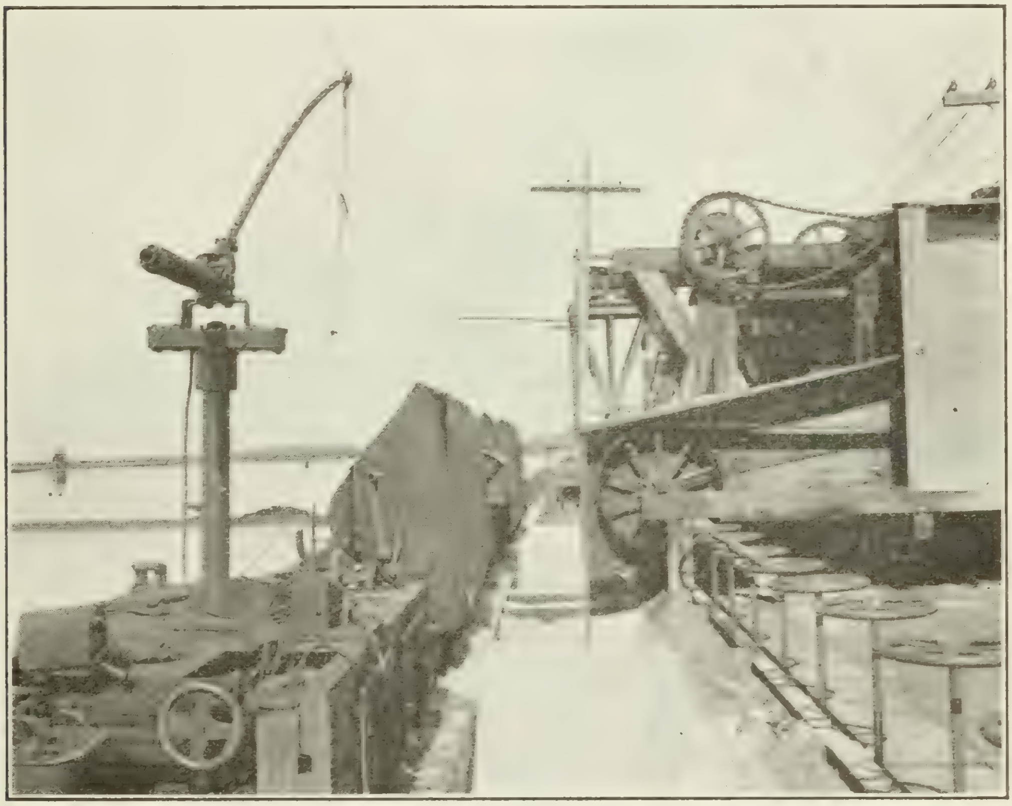
Western Salt Company's Plant. General View.

The Western Salt Company is not incorporated. Mr. E. S. Babcock is the chief owner of the enterprise. The plant is situated in the south end of San Diego Bay, the railroad station being called Fairfield. The holdings comprise about 900 acres of tide marsh, which by dredging and the building of dikes has been laid out in a series of inter-communicating ponds of slight depth. The six largest ponds adjacent to the bay are known as the tide ponds. During high tides, which occur about twice a month, these are filled with water from the bay which flows in at a strength of twelve to fifteen salinometer degrees and is retained by flood gates. The density in San Diego Bay is said to be greater than that of the water of San Francisco Bay. After staying in the tide ponds a short time the water is moved by pumps into the secondary ponds which are smaller and shallower, and greater in number. Here it again remains and is strengthened by solar evaporation and is transferred by gravity into the lime of pickle ponds, at this time having a density of about sixty-six degrees of the salinometer. In the pickle ponds the brine reaches a strength of one hundred salinometer degrees or a specific gravity of 1.201, by which time the gypsum, magnesia salts and other foreign matter have been deposited so that when moved from the pickle ponds into the crystallizing ponds it is freed from all objectionable impurities. In these crystallizing ponds, of which there are fifteen, when a specific gravity of 1.215 is reached, the salt begins to crystalize out, and at 1.235 to 1.252 specific gravity, salt of the first quality is deposited, after which the remaining brine, known as bittern water, is pumped off and allowed to seep into a part of the marsh. As the bittern water is withdrawn, new brine is transferred from the pickle ponds into the crystallizing ponds and thus the process continues until the salt deposit has reached a depth of eight or ten inches. This is considered a practical maximum, since if a greater depth is permitted to form, it becomes so compact that it takes an excessive amount of labor to break it up. A depth of nine inches is estimated to yield 1,800 tons per acre.

Western Salt Co. Harvesting.

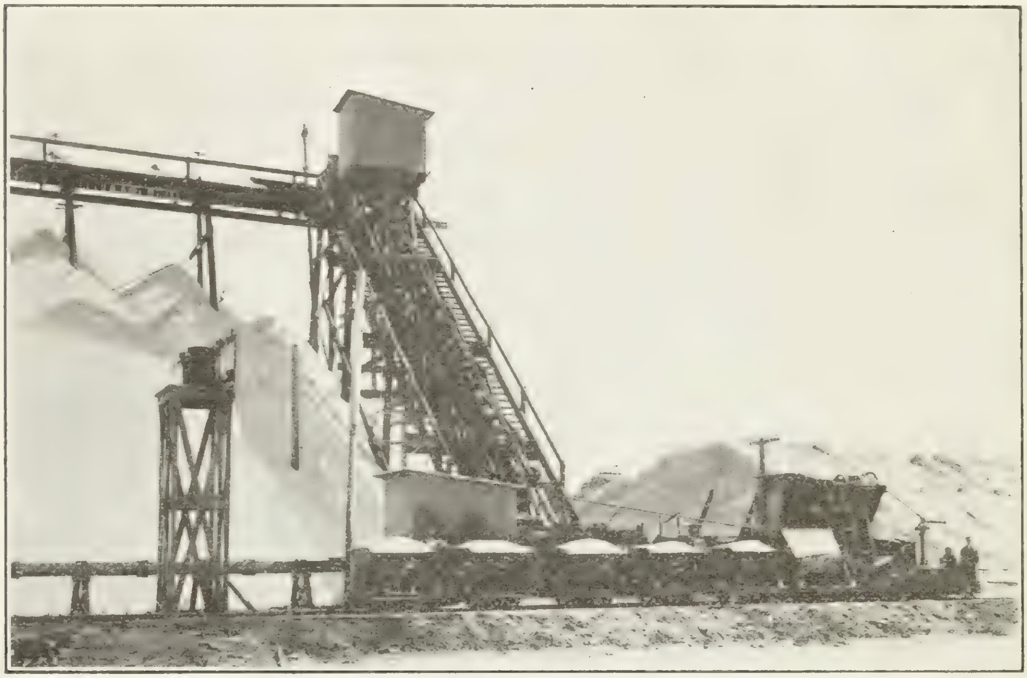
When the desired thickness of salt has been deposited the pond is drained and a crew of men is set to work to harvest the salt. Movable tracks are laid on the bottom of the pond and small dump cars, similar to ore cars, moved by gasoline locomotives, are used to receive the salt which is loaded by shoveling. From the pond where the salt is harvested the loaded cars are transferred to a small electric railway which runs along the crystallizing ponds, and thence go to the washing plant, where the salt is raised by a bucket conveyor and distributed into piles.

The methods of washing and elevating are ingenious and effective. From the cars the salt is dumped into a trough, at the bottom of which is a screw conveyor. This carries the salt to a small bucket conveyor, which lifts it a few feet up into a washing trough. Here, as the salt is moved along by a screw conveyor, it is washed by a current of saturated brine flowing in the opposite direction. From this washing trough, the salt is raised by a conveyor having buckets made of wire mesh. These successively pass under a stream of brine, which washes out any remnant of foreign matter which may be adhering to the salt. During the ascent, a final washing is given with a spray of fresh water. This conveyor raises the purified product to the top of a trestle about a hundred feet high and discharges it into a long trough through which, by screw conveyors, it is transported to be dumped at convenient points in storage piles to await the demand of the market.



Western Salt Co. Salt Washing Equipment.

The present production is about 15,000 tons and arrangements have been made to increase this to nearly 40,000 tons during the next year. The harvest season begins about September 1st and lasts through about three months. The salt is used for curing fish and hides, shipments being made as far north as Alaska for the former purpose. It is also used in the manufacture of ice cream and in various forms of business in which coarse salt is used. The following analyses show its composition and purity:



Western Salt Co. Salt Stacker.

STAUFFER CHEMICAL COMPANY.
Laboratories.
San Francisco, Cal., October 30, 1912.

Constituents determined	Per cent			
	No. 1 Old salt unwashed	No. 2 Old salt washed	No. 3 New salt unwashed	No. 4 New salt washed
DRY SALT.				
Insoluble in water	.084	.050	.044	.054
WATER SOLUBLE.				
Calcium sulphate	.224	.203	.202	.179
Calcium chloride	.194	.050	.186	.046
Magnesium chloride Magnesium sulphate	.606	.296	.331	.215
Sodium sulphate	.350	.121	.317	.110
Undetermined	.087	.071	.065	.079
Sodium chloride	98.455	99.209	98.855	99.317
(Including small amount of potassium chloride, and iron and aluminium sulphate)	Trace	Trace	Trace	Trace

E. C. MISSBACH, Analyst.

The Chollas Valley Salt Company, controlled by J. P. Duncan, 1420 National avenue, San Diego, has a small plant. Its production amounts to 600 to 700 tons yearly.

PHOSPHATES.

Minerals containing phosphoric acid are in demand as a source of this material for fertilizer, but no deposits of commercial importance have yet been found in San Diego County. Two occurrences have, thus far, been reported. One is said to be apatite, in crystalline limestone, near the Grapevine camp in Sec. 26, T. 11 S., R. 4 E. This was, at one time, controlled by David McGregor, of the Montezuma Mining Company.

Another is a deposit of white calcareous material forming a layer or stratum in the mesa east of Otay. This shows, on analysis, less than 2 per cent of phosphoric acid and is, therefore, not available commercially. Apatite, in limestone, is also reported from the vicinity of Jacumba.

WATER.

This is probably the most important of all minerals. Raised from the ocean by evaporation, transported in the clouds and fogs and precipitated by fall of temperature, water deserves the greatest attention and the most energetic form of conservation.

In San Diego County, the chief rainfall is on the west slope of the divide and, in the mountains, averages 30 inches per year. Taking into consideration the fact that a substantial percentage of this area is stony and unfit for agriculture, we see that, if conserved, the run off from the western slope should be ample to irrigate all the arable land.

For details of rainfall, the reader is referred to the records of the U. S. Weather Bureau and for measurements of stream flow to Water Supply Paper No. 300, U. S. Geol. Survey.

MINERAL WATERS.

A number of mineral springs have long been known in this county, some of them having a high reputation as curative agents. For some years the annual production and sale of bottled water has been considerable, but of late, it has declined, possibly through the increasing out-of-doors habit of living, which has come with the development of the automobile. The principal springs are here enumerated.

The Coronado Spring.

This spring is southwest of Otay, in Sec. 22, T. 18 S., R. 2 W. An analysis by C. Gilbert Wheeler gives the following composition:

Analysis	Grains per gallon
Sodium chloride	10.168
Potassium chloride	.912
Potassium sulphate	.552
Magnesia sulphate	4.728
Calcium carbonate	6.488
Calcium sulphate	1.328
Peroxide of iron	.040
Silica	1.080
Organic	.992

This water is not, at present, in commercial use.

Nuvida Mineral Spring.

This spring, about 10 miles east of San Diego and formerly known as Isham's Spring, is in the Jamacho Grant, north of the Sweetwater Reservoir. It is owned by W. Freeland Kendrick, 8 South Eighteenth street, Philadelphia. W. C. Sherman, of Spring Valley, is the local manager. During the past year no water has been placed on the market.

Analysis	Grains per gallon
Sodium chloride	16.32
Potassium chloride	1.98
Magnesium chloride	10.10
Calcium chloride	2.93
Calcium carbonate	11.19
Magnesium sulphate	3.48
Iron peroxide	.03
Manganese carbonate	.17
Silica	3.09
Alumina	.09
Total solids per gallon	49.75

A mineral spring belonging to F. W. Bradley, of San Diego, is about 4 miles north of Foster in Sec. 12, T. 14 S., R. 1 W. No analysis is available, but the solid contents are given at 8 grains per gallon of which 5 grains are sodium chloride.

El Granito Mineral Springs Company.

Manager, C. C. Goldsberry. Main Office, 1015 Twenty-first street, San Diego.
Branch Office, 1065 Second street, San Diego.

These springs are owned by William H. Fisher and are about a mile southeast of El Cajon, in 70 acres of the El Cajon Grant, described as the SW. $\frac{1}{4}$ of SW $\frac{1}{4}$ and E. $\frac{1}{2}$ of NW. $\frac{1}{4}$ of SW. $\frac{1}{4}$, Sec. 14, T. 16 S., R. 1 W.

The curative properties of these waters in regulating the digestive functions have been known from earliest times and were greatly valued by the Indians.

Analysis.

By Joseph Luce, Salt Lake City.

U. S. gallon of 231 cubic inches contains—

	Grains
Sodium chloride	2.448
Potassium carbonate	6.810
Sodium bicarbonate	14.164
Sodium carbonate	7.390
Potassium sulphate	.168
Magnesium sulphate	16.873
Aluminum oxide	.540
Calcium oxide	.392
Iron oxide	Trace
Silicium oxide	.927
Carbonic acid (free)	2.216
Organic matter	Trace
Total	51.928

The company is equipped with a bottling plant in operation since June, 1913. The monthly output is from 800 to 1,000 gallons.

Warner's Hot Springs.

These springs, long known to the natives as Las Aguas Calientes, are situated at the northeastern margin of the old grant, known as San Jose del Valle, and by county highway are about 67.6 miles from San Diego.

The property is controlled by a syndicate which conducts a hotel and sanitarium on the property. Manager, F. S. Sandford. The postoffice is known as Warner Springs. The temperature of the water is stated at 148° F. and the analysis is given as follows:

	Grains per U. S. gallon
Sodium sulphate	5.65
Sodium sulphide	3.53
Silica	3.44
Sodium silicate	2.64
Sodium carbonate	2.63
Sodium	2.39
Potassium sulphate	0.43
Calcium silicate	0.38
Calcium phosphate	0.11
Ammonium	0.09
Magnesium sulphate	0.09
Sodium biborate	0.09
Ferric oxide	0.04
Lithium	Trace
Strontium	Trace
Magnesium oxide	Trace

Buckman Springs.

Buckman Springs Mineral Water Company, 515-516 Union Building, San Diego. President, Geo. W. Walker; secretary, T. B. Cosgrove. These springs are about 60 miles east of San Diego in Sec. 20, T. 16 S., R. 5 E. The company has recently bought the springs and hotel with 160 acres of land. The water is bottled, charged with natural gas and shipped in large quantities, being recommended for rheumatism and similar ailments. An analysis by Smith, Emery & Co. follows:

	Grains per U. S. gallon
Silica (SiO_2)	5.55
Alumina (Al_2O_3)	0.43
Iron bicarbonate ($Fe(HCO_3)_2$)	2.45
Calcium bicarbonate ($Ca(HCO_3)_2$)	61.90
Magnesium bicarbonate ($Mg(HCO_3)_2$)	10.18
Magnesium sulphate ($Mg SO_4$)	4.75
Calcium sulphate ($Ca SO_4$)	0.86
Magnesium chloride ($Mg Cl_2$)	2.09
Manganese perchloride ($Mn Cl_4$)	Trace
Potassium chloride ($K Cl$)	1.21
Lithium chloride ($Li Cl$)	14.93
Sodium chloride ($Na Cl$)	47.65
Sodium nitrite ($Na NO_2$)	Trace
Sodium bicarbonate ($Na HCO_3$)	6.03
Total solids per gallon	158.03

	Parts per million
Free ammonia (NH_3)	0.082
Albumenoid ammonia (NH_3)	0.086
Oxygen absorption	1.400
Free carbonic acid gas (CO_2)	730.5
Free carbonic acid gas (CO_2), expressed in cubic centimeters per liter, O°Cent. and 760 m. m. pressure	371.7

On the old ranch known as Corral de Luz, lying just north of the Sta. Margarita Grant, about 18 miles northeast of Oceanside, there are said to be several mineral springs, but no analyses are on record.

At Jacumba are warm springs of medicinal properties and baths for visitors have long been established here. (See under the next head.)

Desert Springs and Wells.

In the desert areas, springs of potable water are of much importance, both to the traveler and to those who endeavor to develop or operate mines. Inasmuch as many years must elapse before sufficient capital can be invested to reclaim and utilize all the desert areas in this part of California, it will be useful to give here a list of the desert springs. The following information is chiefly taken from U. S. G. S. Water Supply Paper No. 224, prepared in 1908 by W. C. Mendenhall, mainly from data furnished by Professor Gilbert E. Bailey, who some years ago prepared for the State Mining Bureau, Bulletin No. 24 on the Saline deposits of California. It is not improbable that in the six years which have elapsed some local changes may have occurred.

"*Clark Well.*—This is in Sec. 8, T. 9 S., R. 6 E., near the northeast end of Clark Dry Lake, at an elevation of 555 feet.* Trails lead to it from Rock House Canyon on the northwest and from Coyote Creek Valley, and a little used wagon road connects near Borrego Spring with the road from Seventeen Palms Springs to Julian. The well can easily be found from its position north of the dry lake. The water is good.

"*Borrego Spring.*—This is in Sec. 17, T. 11 S., R. 7 E., on the west bank of the broad Borrego Wash, at an elevation of 452 feet. It is about 33 miles by wagon road from Julian. The water of this spring, although somewhat alkaline, is entirely usable. Mesquite trees grow near the spring and in the valley, and salt grass, willow, and rushes are abundant. An old cabin stands on the bank about 50 feet from the spring and serves to mark its position.

"*Seventeen Palms Springs.*—These springs lie in Sec. 35, T. 10 S., R. 8 E., at an elevation of 410 feet, near the junction of three washes in the clay hills, south of the Santa Rosa Mountains. At present only eight or nine palm trees stand near them, the remainder of the seventeen, from which the springs were named, having been destroyed by fire. The springs are about 12 miles by wagon road east from Borrego Spring, or 45 miles from Julian, but the road is little used, is dim, and may be difficult to follow, particularly after the winter rains. Broken clay hills and deep washes surround the springs. Grass and wood in small quantities may be found near them. When they are kept open the water is fairly good, but it becomes bitter and bad by neglect and disuse. The soil is impregnated with alkaline salts.

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*See Indio Quadrangle, U. S. G. S. The section, township and range numbers are supplied by the present writer.

"*Vallecito Springs.*—Vallecito Springs are in the valley of Vallecito Creek, Sec. 11, T. 14 S., R. 6 E., about 33 miles east of Julian, on the road to Carrizo station, at an elevation of about 1,600 feet. The old adobe stage station, in use when this road was a transcontinental stage route, still stands and is in fairly good condition. A watering trough stands near the building, and there are mesquite and cottonwood trees in the vicinity. The quality of the water is fair.

"*Hanna Well.*—This well is approximately in Sec. 36, T. 13 S., R. 8 E., at the base of the north slope of Black or Fish Creek Mountain, 15 or 18 miles southeast of Borrego Spring, and 10 or 12 miles southwest of Harper (or Mesquite) Well. It is not on a main road, but is near the mouth of a canyon heading in a pass that leads to the valley of Carrizo Creek. The water is good.

"*Agua Caliente Springs.*—About 3¾ miles eastward from Vallecito Springs and about ¾ of a mile southeast of the wagon road between Julian and Carrizo station there are several springs in a natural amphitheater comprising an area of about 50 acres. The water is tepid and impregnated with sulphur, but is not unpleasant to the taste. The combined flow of the springs makes a rather large stream. Grass and wood are scarce.

"*Mountain Palm Springs.*—These are in Sec. 12, T. 15 S., R. 7 E., at the foot of a high, broken rocky ridge and are several miles south of the main wagon road across the Sierra Madre, but can be easily reached by a side road that was made a few years ago. The water is cool and fairly good. Wild palms and other vegetation make the vicinity inviting.

"*Palm Springs.*—There are several palm springs in San Diego County, but those here referred to are about 9 miles east of Vallecito Springs, just north of the line between Secs. 25 and 36, T. 14 S., R. 7 E. The palms that gave the springs their name were destroyed long ago, but there are several mesquite trees near by. The springs are situated under a clay bank, and digging is sometimes necessary in order to obtain water. The water has a temperature of about 60° and is somewhat sulphurous.

"*Mason Ranch.*—Mason Ranch is in Sec. 1, T. 14 S., R. 5 E., on the road from Carrizo Creek to Julian and Agua Caliente (Warner's Hot

Springs). This is the principal road through this part of the desert, and may easily be followed. At the ranch an excellent supply of water has been developed.

"*Carrizo Station.*—This Station, Sec. 12, T. 15 S., R. 8 E. (elevation 450 feet), is near the left bank of Carrizo Creek wash, about 9 miles east of Palm Springs, on the main road from Julian to the Imperial Valley. There are a number of springs near the station, and two of them furnish fairly good water. There is also a rather large tule swamp around the station, from which a strong stream of alkaline water flows. Rough clay hills of late Tertiary age, showing typical bad-land erosional forms, are prominent features of this region. Carrizo was originally a stage station on the old line to Yuma, but the adobe buildings are now very dilapidated, their ruin having been completed by the earthquake of February, 1892.

"*Mountain Springs.*—These springs, in Sec. 24, T. 17 S., R. 8 E., are about 9 miles by road from Jacumba Springs and 33 miles from Campo, at an elevation of about 2,500 feet. Forty years ago there was a stage station here, on the Butterfield stage line from San Diego to Yuma. The ruins of the old stone corral and buildings are still visible. Water issues from the side of a rocky ravine and a portion of it is carried in an inch pipe about 200 feet to a trough beside the road. The quality is excellent.

"From Mountain Springs the road to El Centro passes through a rocky gorge in which water can be found a portion of the year.

"*Jacumba Springs.*—These are about 24 miles east of Campo, on the line between Secs. 7 and 8, T. 18 S., R. 8 E., and about ¼ mile north of Monument No. 233 of the international boundary, at an elevation of about 2,825 feet. They are all on the west side of the long, open valley of Carrizo Creek, whose outlet is to the northeast, through a deep narrow gorge, of which the greater part, including its head, is in Mexico. The springs include one of cold water and several that yield waters with temperature ranging from 86° to 98° Fahrenheit. These thermal waters are regarded as medicinal, and a bath house and other accommodations are provided for travelers."

The two foregoing groups of springs are on the automobile stage route from San Diego to El Centro, Imperial County.

CHAPTER II.

IMPERIAL COUNTY.

HISTORY.

This county formed part of San Diego County from the organization of the latter in 1851 to August, 1907, when it was separated and formed into a separate county by vote of the supervisors of San Diego County under an act of legislature giving them that power.

PHYSIOGRAPHY.

The most important feature of Imperial County is the broad and nearly level expanse of the Colorado River Delta which separates the Gulf of California from the Salton Basin and is generally known as the Imperial Valley. This basin lies in a synclinal valley bordering on the east the anticlinorium of the lofty granite ranges of San Diego and Riverside counties. Several small ranges of volcanics, metamorphic palæozic rocks and uplifted Tertiary beds, interrupt the general level of the delta plain and, on its eastern margin, is an extensive hilly area of volcanic rocks which continues eastward into Arizona. The great granite masses of San Diego County, barely appear east of the boundary line.

GEOLOGY.

In its general geology, Imperial County is closely linked with San Diego and, under that head, will be found a synopsis of the more important geological features. The chief item that is distinct is the history of the Salton Basin.

It appears that, in Tertiary time, this basin was the northern end of the Gulf of California, which extended some 160 miles farther north than at present, and extensive marine deposits were laid down, as shown by the marine Miocene fossils associated with the clays on its western margin. This condition of submergence probably continued after the close of the Tertiary and later, as the Pleistocene uplift of about 1,000 feet above present sea level which occurred on the Pacific coast of California probably involved this valley, a large part of the Tertiary Gulf of California became dry land. With the succeeding subsidence came another marine occupation of the valley. In the meantime, the delta deposits of the Colorado River, which debouched into this basin near Yuma, gradually increased in extent and altitude until they formed a natural dam of great width, isolating, from its connection with the gulf, that portion of the basin north of the present area of settlement. The Salton Basin was then occupied by a salt lake which, in that arid climate, was gradually dessicated and finally became dry, leaving behind large deposits of salt. From that time on, Salton Basin was alternately dry and flooded by the waters of the

Colorado as, from time to time, the river found its outlet toward the gulf or toward the north.*

The local Indian tribes have various traditions of the presence of a great lake in the valley and its existence is proven by the presence of great numbers of fresh and brackish water shells, which gave to the northern part of the basin, in Mexican times, the name of the Conchilla Valley, barbarized by later inhabitants into Coachella. There is, also, substantial evidence of this lake in the old beach line which has been traced around the basin at an altitude of about 40 feet above sea level.[1]

For this prehistoric body of water the name of Lake Cahuilla was proposed by its discoverer, Prof. W. P. Blake.†

The earliest inundation after the American occupation of the region occurred about 1849. The lake of that period also dried up and the Salton desert was without water until June, 1891, when another overflow of the Colorado River produced a lake 30 miles long and 10 miles in width.[2] This, in time, gradually evaporated and became much reduced in area, but in 1904, through the careless opening of the north dike or levee, in connection with the irrigation of the Imperial Valley, the river was again released and the Salton Basin was flooded and the submergence rapidly increased, doing great damage, until the Southern Pacific Railway Company, under presidential authority, closed the gap in February, 1907.

MINERAL RESOURCES.

While of no great variety in its mineral resources, Imperial County is not deficient in natural wealth as, apart from its great agricultural possibilities, its deposits of crystalline limestone and clay promise a great supply of building material which should make it a center of production for a very large area. Its production of metals also, may be important in the near future.

In the following pages these resources are briefly outlined.

GOLD.

The gold deposits of this county are in the southeastern corner, occurring in ranges with northwest trend, between the line of the Southern Pacific Railway and the Colorado River. They are also in the northwest extension of the famous gold belt of the Altar District of Sonora, Mexico. The persistence of this zone in direction, through a distance of many miles, is very marked, though it is not a zone of continuous mineralization. In Mexico the auriferous areas are separated by barren spaces, sometimes miles in extent, the precious metal being confined to metamorphic and sedimentary formations and not found in the granites which underlie them. This fact suggests that the latter are younger than the period of metallization.

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*See further U. S. G. S. Water Supply Paper No. 225, by W. C. Mendenhall, pp.17–20. Also U. S. G. S. Water Supply No. 300, by H. D. McGlashan and H. J. Dean, pp.29–33.

†Nat. Geogr. Mag., Vol. 18, p. 830.

[1] Wm. P. Blake, Pacific Railroad Reports, Vol. V, 1853.

[2] E. B. Preston, R. XI, pp. 387–393.

Of the ranges mentioned, that known as the Cargo Muchacho Range, in which are the Golden Cross, the American Girl, the old Cargo Muchacho mine and others, is of metamorphic gneiss and schist cut by pegmatite dikes, and lies 3 to 4 miles northeast of the line of the Southern Pacific Railway, its southeastern extremity being about 9 miles from Yuma. Along its major axis, which trends northwest, it measures about 9 miles and in a transverse direction about 5 miles. This range is surrounded by a gentle sloping plain or mesa and is divided into two nearly equal portions by a deep canyon trending southwesterly. In the northern section, sometimes called the Hedges Mountains, of which the summit measures 2,225 feet, are the Golden Cross mines and, in the southern section, of which the chief peak rises 2,130 feet, are the American Girl and the old Cargo Muchacho mine and others. In the various peaks and ridges, many auriferous veins have been found, and in all the gulches of the range and the washes leading from them, placer gold has been abundant. Northeast of this range, the plain or mesa, has an altitude of 750 to 900 feet and a width of some 4 miles, being succeeded toward the Colorado River by the mountains of the Picacho district, of which the chief summit, El Picacho, attains a height of 1,945 feet.

The Picacho hills, over an area of perhaps 100 square miles, are chiefly of volcanic lavas, tufas and conglomerates, but as shown in the deeply eroded areas, the volcanics are underlain by metamorphic schists and gneisses of various types which contain the chief gold deposits and may be equivalent in age to those of the Cargo Muchacho Range. The topographic features of this area are shown in detail on the U. S. Geological Survey topographic sheet known as the Yuma Quadrangle, as well as the position of the Golden Cross and American Girl mines.

Cargo Muchacho Range.

R. XIII, p. 333.

While the presence of gold in this region had been known from early times and had been the basis of dry placer mining on a small scale, it was not until after the completion of the Southern Pacific Railway to Yuma in 1877, that much underground mining was done. In 1878–79, a 20-stamp custom mill was built on the river about 6 miles below Yuma at the place called El Rio by Gillespie and Childs, under the name of the Yuma Mill and Mining Company. Here ore was treated, at first from the Cargo Muchacho mine and afterwards from the Golden Cross. The latter, having been the most productive of the properties in this district, will be described first:

The Golden Cross Mines.

R. XII, p. 240. R. XIII, p. 337.

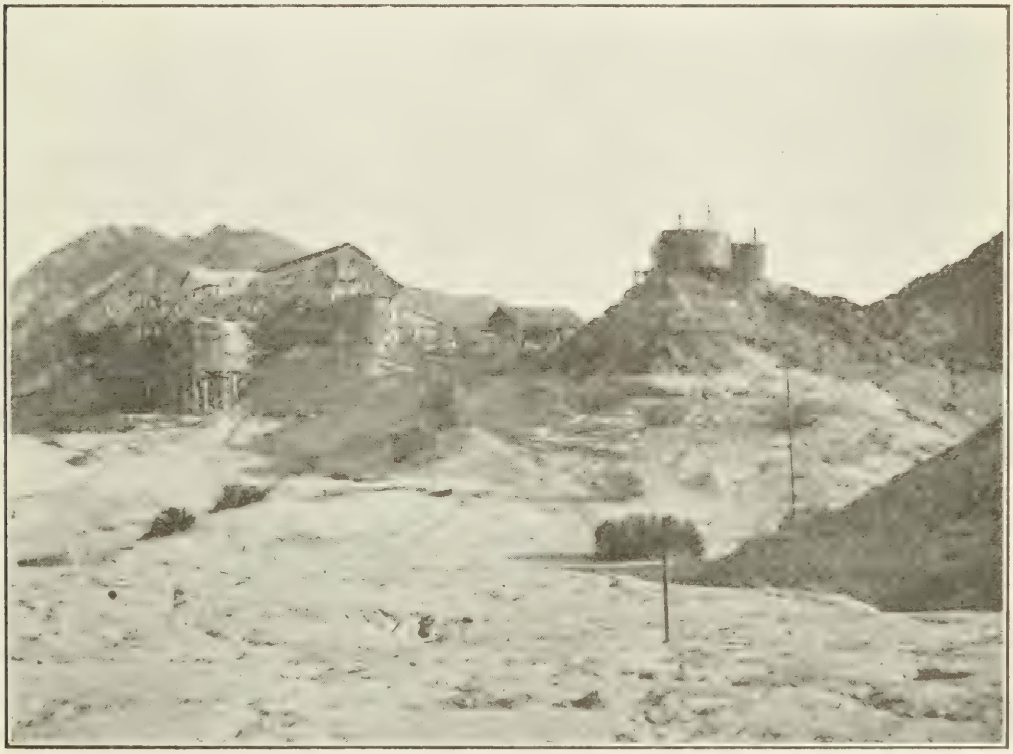
In a re-entrant of the west margin of the Cargo Muchacho range, is the mining camp formerly known as Hedges, but rechristened Tumco by the United Mines Company, from the corporation title of which the abbreviated name is formed. Here is the group of mines known as the Golden Cross, from the former name of one of the claims, now relocated as the Missouri.

The original claim was located in 1884 by one Peter Walters, under the name of Little Mary. Soon, other claims were located and changed owners several times until, in 1893, the properties were taken over by the Golden Cross Mining and Milling Company. This was succeeded in 1897, by the Free Gold Mining and Milling Company, which in turn was superseded in 1910 by the United Mines Company, Dr. Milbank Johnson, President, 1215 Marsh-Strong Building, and D. S. Cook, Secretary, 805 Central Building, Los Angeles.

Pegmatite Dikes in Schist, Tumco. F.J.H.M. Photo.

At Tumco, the prevailing formation is a micaceous quartz schist, in part feldspathic, weathering brown on the surface and cut, in all possible directions, by a myriad of pegmatite dikes, varying from a few inches to a few feet in width. Undoubtedly, to these dikes the range owes, in great measure, its preservation from the erosion which has removed from view the larger portion of this formation formerly exposed above sea level.

The ore bodies at Tumco are in quartzose schist or gneiss, probably a metamorphosed arkose, and the mineralization parallels the stratification in certain layers of the schist. The mineralized beds dip about 30° southeast with a strike of north 34° east. In the past a very substantial thickness of the rock, from 15 to 25 feet, has been mined as ore, but some of this was of very low grade. The country is extensively faulted and at least two systems of faults exist. One of these, a major system, trends nearly northeast and southwest and the minor system has a trend nearly at right angles to this or a little east of south. There are three shafts and groups of workings in the camp known as Golden Queen, Golden Crown and Golden Cross. The two last are believed to be in the same stratum. The Golden Queen, which is 1,000 feet deep on the incline, is in a monoclinal fault block, north of that which contains the other two and it is probable that the two ore bearing strata were once continuous, faulting in the major system having displaced and cut off the Golden Queen block from that containing the others. The property is now under very careful and conservative management, being under bond to Seeley W. Mudd of Los Angeles, and keen ability is being directed to the discovery of ore beyond the secondary fault planes and to the development of the old ore bodies already opened. At the moment all work is being done on the Golden Cross. Here the shaft measures 1,200 feet on the incline. The Golden Crown is 1,100 feet deep on the incline.



The Golden Cross Mill, Tumco. F.J.H.M. Photo.

The property is well equipped with a 100-stamp mill, which has recently been fitted with a tube mill. The equipment in detail was as follows, in December, 1913.

One No. 5 Gates rock crusher;
One Robbins 18-inch conveyor with distributor over battery bins;
50 stamps equipped, but 20 running at present;
One 22′ by 5′ tube mill;
Two Akins classifiers;
One Dorr classifier;
Two 10″ by 54″ Frenier sand pump;
One Dorr thickener 36 by 12′;
Two Trent replacers 24 by 16′;
One air lift agitator 24 by 16′;
Two Trent replacers 25 by 16′;
Two special replacers 24 by 16′.

With necessary sump tanks, zinc boxes, etc. No amalgamation or concentration is used. Cyanide solution is added in the stamp battery. All slime product is treated by agitation and the Trent replacement process.

The Golden Cross group has been a noted producer of gold in the recent past, the production having amounted to several millions of dollars. The operations of Mr. Seeley W. Mudd were discontinued in September, 1914.

American Girl.

R. XIII, p. 331. Register Mines and Minerals, 1902.

This property about 5 miles northeast of Ogilby and 3 miles southeast of Tumco, was extensively worked some fifteen years ago. It is now controlled by the Imperial Reduction Company of Pasadena, R. Schiffman, president; MacD. Snowball, secretary; C. Terry DuRell, general manager.

The geological conditions are very similar to those at Tumco. The ore is quartzose vein matter and silicified country rock, carrying iron pyrites which contain the gold. The development work on the property was described in the Register of Mines and Minerals in 1902, as being 1,000 feet deep on the incline and no mining has been done for some years, but the mill has been newly equipped for the resumption of operations. The treatment will be by grinding in Hardinge mills, removing the slime to cyanide tanks and passing the sands over Richards classifiers from which they will go to Deister tables for concentration. The concentrates will be shipped and the slimes will be cyanided by the Trent replacement process.

Since the writer's visit, mining and milling have commenced at the rate of about 75 tons per day.

A cloudburst during the second week in November, 1914, flooded the lower workings and it is estimated that 4 months will be required to unwater the mine and open the shaft. (Min. and Sci. Press, Nov. 28, 1914, pp. 855–6.)

In addition to the two active properties above described, there are several others in this district of which some have scarcely been opened, while others have been worked and abandoned years ago. The following is a list of these properties:

Name	Location	Owner
Delta	Adjoining Golden Cross on the northwest	Thos. Johnston, Ogilby, Cal.
Banner Group, 6 claims	Adjoining Golden Cross on east	Larry Wren, Ogilby, Cal.
Mayata	Adjoining American Girl on west	Thos. Johnston, Ogilby, Cal.
Englewood		H. Randolph, Ogilby, Cal.
Yuma	Adjoining American Girl on east	J. Ernest, Los Angeles, Cal.
Arizona		

The foregoing six properties have never been producers but the following in years past have been productive. At this date there is nothing to be stated except the details of their history and so the reader is referred to Reports XI, XII and XIII and to the Register of Mines and Minerals of San Diego County.

Pasadena and southern extension or Mother Lode, 1 mile northeast of American Girl; $\frac{2}{5}$, Wm. Borthwick, Ogilby, Cal., $\frac{2}{5}$, P. B. Mathiason, St. Louis, Mo., $\frac{1}{5}$, Mrs. Irene Grimes, Pasadena, Cal. R. XI, p. 386. R. XII, p. 242. R. XIII, pp. 341, 343.

Guadalupe, 1½ miles northeast of American Girl; owner not known.

Blossom, 3 claims, 1 mile southwest of American Girl; John McEwan, Ogilby, Cal. R. XII, p. 238. R. XIII, p. 333. R. M. & M., p. 6.

Padre y Madre, adjoining Blossom on southeast; Mrs. S. B. Wright, San Bernardino, Cal. R. XII, p. 242. R. XIII, p. 343. R. M. & M., p. 6.

Cargo Muchacho (Pat.), 1½ miles southeast of Blossom. R. VI (Pt. 1), p. 81. R. XI, p. 385. R. XII, p. 239. R. XIII, pp. 333–4. R. M. & M., p. 6. Owner not known.

PICACHO.

This district, which lies near the Colorado River in T. 13 and 14 S., R. 22 and 23 E., has long been a seat of operations in vein and placer mining and the total production has been large. In the thirteenth report of the State Mineralogist, pages 331–346, will be found much detail about the mining claims and operations in this region in 1896. See also Register of Mines and Minerals, San Diego County, 1902.

Earlier records are to be found in the twelfth report, pp. 237-243.

About 1896 or 1897 came into this region one S. W. Dorsey, who undertook to consolidate all local interests in one large corporation.

From this movement resulted successively the following companies: California Gold King Mining Company, organized about 1902, next the California King Gold Company, and finally, about 1906, the Picacho Basin Mining Company. In these companies were included about thirty claims of which sixteen were patented including the old Picacho group; Apache, Dulcinea, Eastern California, Golden Casket, Golden Rule, Extension, Mina Rica, Tierra Rica and Helen May. Also the White Gold Basin mines formerly of D. K. Allen, deceased, of Picacho. Albert Polhamus, Alcyon, Alfonso, Golden Crown, Golden Dream, Golden Hill, Golden Sunshine, Jita, Oriental, Ponce de Leon. Also the D. C. Jayne mines: Goshen, Mars, St. George and Venus. There were besides 6 mill sites.

Mill of the Picacho Gold Basin Mining Co. F.J.H.M. Photo.

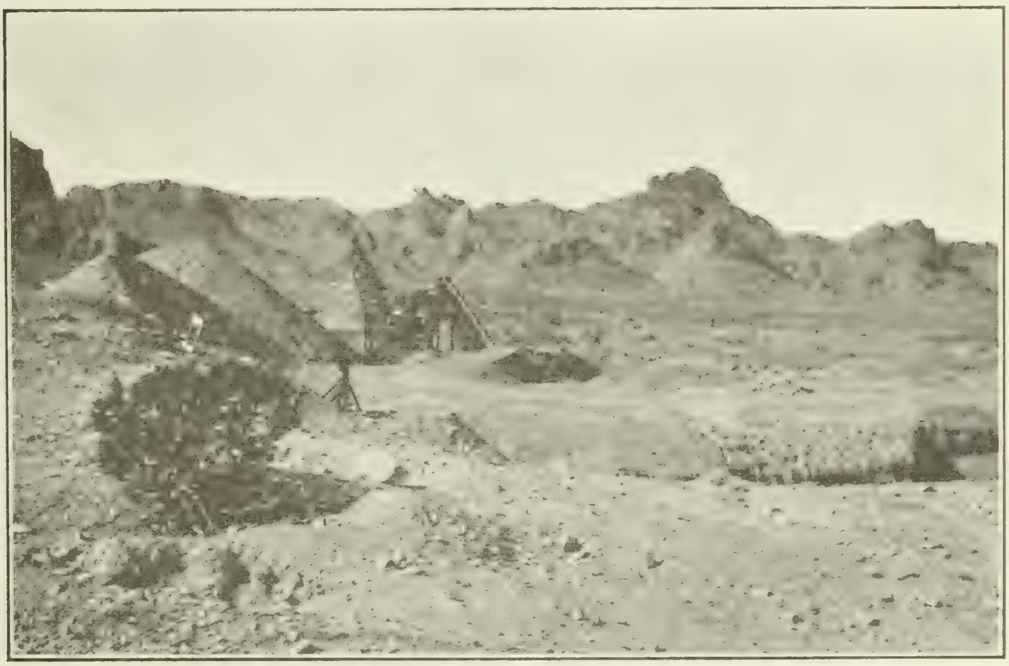
The chief production of these consolidated properties was about 1904–06. In 1908 the 450-ton mill, which at first was on the river 5 miles from the mines, was moved to the latter. They closed down in September, 1910. The ore, which was of low grade, occurred in lenses in schist, dipping at an angle of 45°. The last shoot worked was 250 feet long and 160 feet wide. The managers were successively: J. Emerson Gee, of Los Angeles; R. K. Humphreys, Burdette Moody, of Pasadena, and E. W. Carson, of Los Angeles. The properties were sold under execution October, 1912, and are now held by the Ridgeway Estate through The Quaker City Bank of Philadelphia.

At present, owing to the general depression in the mining industry there is nothing being done in this district except development work on some placer claims.

Along the arroyo, between the Picacho mine and the village, is a placer field on which several locations have been made. Wm. D. Sibley and T. A. Ashby have claims here and also Geo. Coryell, of Picacho.

Many of the old claims mentioned in the State Reports have been allowed to lapse and have been forgotten.

About seven miles by stage road in a direction N. 75° E. from Glamis are the old diggings of the Mesquite Placer, located in Sec. 21, T. 13 E., R. 19 E., at an elevation of 950 feet, the gravels lie along the washes of the present water courses, from the Chocolate Mountains, which drain into the bed of Dry Lake against the Sand Hills ten miles to the south. The placer gravels are in places fifteen feet deep but are not continuous and probably an average depth would not be over six feet. Water was packed from Glamis during the early work on the Bay Horse* claim and the gravels panned and run through rockers. Some dry placering has also been done. Although the deposits are not continuous, but cut through by arroyos, they vary in width up to one half mile and extend for about two miles along the flank of the Chocolate Mountains. One of the principal owners is P. H. Ferguson, 4507½ Esmeralda street, Los Angeles, California.



Part of the Placer Field, Gold Basin. Picacho Peak in Background.
F.J.H.M. Photo.

Much gold is reported to have been taken from these workings in the early days and probably considerable areas remain which could be profitably worked with proper management.

In the same vicinity as the Mesquite Placer, the Erma Mining Company with twelve claims is doing assessment work on some quartz ledges in the schist. The gold occurs in pockets in the ledges which are seldom over three feet wide. These men are also doing some placer work.

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*The Bay Horse was a Lode Claim. The data refers to the adjoining placer claims.

No placering is reported to have been carried on in the region north of the Chocolate Mountains. Washes of considerable extent occur in that region and the possibilties look almost as favorable as they do to the south.

A few prospects of gold and copper-bearing ore are reported in Hodge's Mountains west of Rannels.

COPPER.

This material is shown by surface stains to be widely disseminated through a considerable area 3 miles southeast of Picacho village. Some drilling has been done here, without satisfactory results. At present Wm. D. Sibley and T. A. Ashby, of Picacho, hold a number of claims on this ground and are carrying on assessment work.

IRON.

A deposit of iron oxide, said to carry 50 to 60 per cent of metal, lies about 3 miles northeast of Mammoth Station at the foot of the Chocolate Mountains.

NICKEL.

This metal has been found on the south slope of Coyote Mountain by W. H. Trenchard, of San Diego, who has located a claim upon it. The ore is chiefly Garnierite, a nickel, magnesium silicate. The extent of the deposit has not been ascertained.

SILVER AND LEAD.

Silver occurs sparingly in connection with lead, 1 mile south of the Colorado River, 5 miles east of Picacho. This ore is lead carbonate and galena in small veins and pockets. Some of it has yielded up to 90 ounces of silver. Wm. Swain, of Picacho, holds some claims there. The principal one, called Mayflower, has a 90-foot shaft.

Located on the south side of a cove in the northern part of Barren Mountain is the old Paymaster silver mine. It would probably be located somewhere in the south half of Sec. 17, T. 11 S., R. 21 E., were the land subdivided. The claims were located about the year 1867 and worked for superficial chlorides. Supplies were brought in from San Francisco by boats which came up the Colorado River and landed near the mouth of Arroyo Seco to the northeast.

Water was pumped from the Colorado River by a plant located on Milpitas Wash near the mouth of Arroyo Seco.

At about the 400-foot level the rich ore had been worked out, and the silver values in the galena being low, the property was abandoned by the original owners. No work has been done since about 1880.

Late prospecting has shown that large bodies of galena, containing low silver values remain. The ore body is about 42 feet wide at the bottom of the old workings. An assay of ore, taken from average samples across the ore body, is as follows:

Assay by the El Paso Smelting Company, of El Paso, Texas, for Mr. J. H. Lightfoot, of Blythe City.

Gold,	Trace.
Silver,	6.2 oz. per ton.
Lead,	73.3 per cent.
Copper,	.0
Insoluble,	7.2 per cent.
Iron,	.5 per cent.
Zinc,	0
Sulphur,	11.0 per cent.

The ore is said to lie along the contact of schist and granite and the ore body strikes about N. 45° E., and dips at an angle of about 75.° It is said that two 400-foot shafts were sunk at a distance of about 1,000 feet apart on the ore shoot, and 200 or 300 feet of stoping done in each shaft. In its days of production there was a stamp mill on the property, which was moved away. Three mining claims are at present held on this property by Robert de Luce, of Dome, Arizona, and William D. Hickey, of Neighbors, California. The claims are called El Tesoro, El Banquero, and Plata Real.

MARBLE.

Bulletin 38, page 107.

The chief deposits of this material in Imperial County are in Coyote Mountain, T. 15 S., R. 10 E. This mountain is largely formed of crystalline limestone but not all of it is fit for marble. Here valuable deposits, within 6 miles of the San Diego and Arizona Railroad, now under construction, are owned and controlled by the Golden State Mining and Marble Company, 309 Watts Building, San Diego, C. A. Walker, president; H. H. Sparks, secretary.

This company owns fourteen deposits, each deposit being of different grade and color. Several have the grade and texture of famous imported marbles.

The Creole group consists of four claims of 20 acres each, covering an outcrop of marble about 4,500 feet long and averaging 600 feet wide. All of the development has been done on Creole claim No. 1. Here are three distinct strata of marble. The first is deep blue-black with a hardness of 3½, free from quartz, chert, or other impurity. It is of uniform color, free from holes or blemishes and is impervious to moisture so that it can not be stained even by red ink. The quarry will produce blocks of large size even at the surface. This is suitable for borders, exteriors and pillars and is probably well suited for monuments.

The second stratum on the Creole group is cream pink in color, with occasional blotches of red and black lines which, in the translucent marble, look like the so-called moss in an agate. This marble somewhat resembles the Italian Paonazza. It has a hardness of 3½, is exceedingly tough and free from impurities, takes a high polish and has the desirable quality of translucency when lights are placed behind a slab. This stone also resists stains of ink or oil.

Outcrops of Creole Marble, Coyote Mountain. F.J.H.M. Photo.

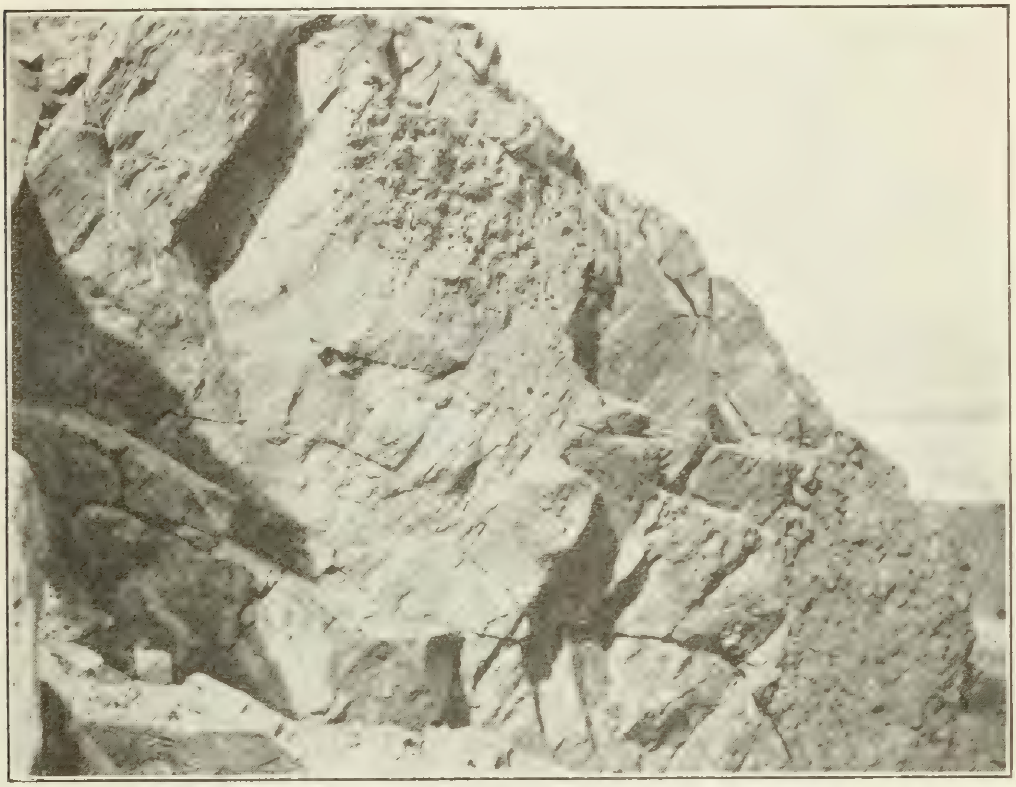
The third deposit of the Creole group is white with a bright green thread line. So far as known, this marble is in small blocks and suitable only for small borders or tiling.

About 2½ miles southerly from the above group is a deposit of marble varying in width from 30 to 400 feet and about 3,000 feet in length.

One end is mottled black and white marble, the color is distinctive. This deposit is solid at the surface. It takes a fine polish and does not show any strings or blemishes. It is suitable for corridors and for interior decoration.

About 600 feet on the other end of this deposit, the marble is very fine grained, and is highly colored in red, yellow, white, purple and blue. In one opening the stone is banded like agate in blue, red and yellow. This marble is over 3½ in hardness, grained like wood and takes a high polish, showing the colors of the African Numidian, as well as lighter and darker tints not seen in that stone.

Near the above deposit the company owns one claim, containing 20 acres of boulders, which appear to be concretions remaining from some overlying formation which has disappeared. The stone is not quite as hard as the ordinary marble, but takes a smooth, glossy finish and shows a great variety of color, including pink, cream, red, yellow, orange and purple, with dashes of green and slender black lines, brecciating the entire mass. This marble is of the Sienna type, but more beautiful and though it can not be obtained in large pieces, it can be used in tiling, soda fountains, knobs and handles for plumbing work, fancy articles and curios.



Creole Marble, Bored by Marine Mollusks. F.J.H.M. Photo.

On the east end of the mountain and about one mile southeast of the above named quarries, this company owns a deposit of blue marble, closely resembling the Esperanza of Vermont. It is fine grained and hard, and is suitable for almost any work to which marble may be put, being especially adapted for monuments. Large blocks of uniform color are ready for shipment.

At the west end of the Coyote Mountain range is a deposit of marble, about one half of which is pure white and as translucent as opal. The other half is a peculiar marble, of lavender tint, without markings of any kind, and can be matched from any part of the quarry. Very little development work has been done here.

This company has erected buildings and ordered machinery for a plant at National City, on the line of the San Diego and Arizona Railroad for the exclusive cutting and finishing of this marble. One carload was shipped on the San Diego and Arizona Railroad last year via El Centro and Los Angeles, and 5 more carloads will be shipped during the coming year to the National City plant.

R. G. Fritz of San Diego also owns eight claims of marble in Coyote Mountain.

CRUSHED STONE, GRAVEL AND SAND.

These building materials are at present brought to the valley chiefly from Riverside County in the vicinity of Whitewater Pass. As the valley cities increase, their demand for such material will lead to the establishment of local plants, since there is an abundance of raw material on the margin of the valley.

LIME AND CEMENT.

On the south slope of the Coyote Mountain and at a point 3½ miles southwest of Coyote Wells are great deposits of limestone.

These deposits are from 3 to 5 miles distant from the survey of the San Diego and Arizona Railroad, and could be easily reached by spurs from that line. About a quarter of a mile from one of the largest deposits is a deposit of blue clay, averaging 70 feet in thickness and covering more than 300 acres of land.

The fact that this limestone carries little or no magnesia makes it ideal for cement manufacture as even a small content of magnesium is undesirable in high grade cement.

An analysis of a sample from Coyote Mountain by F. Salathé is here given:

Calcium carbonate	96.6
Magnesium carbonate	1.7
Silica	Trace
Alumina and iron sesquioxide	.9
Calcium sulphate	.5
Totals	99.7

The raw materials for Portland cement are very abundant on the west side of the Imperial Valley in great deposits of Tertiary clay and crystalline limestone, which are close together, and will soon be within reach of transportation. As the population of the valley increases, there will be a great demand for Portland cement for the lining of irrigation ditches and the local material will doubtless form the basis of a large manufacturing plant.

BRICK.

At various times and at various places in the Imperial Valley, local brickyards have been established and operated for a short time. These now have all been superseded by the Simons Brick Company, main office, 125 West Third street, Los Angeles. Joseph Simons is president and Walter R. Simons, secretary. This company operates at El Centro, about one mile south of the station, a plant for the manufacture of common brick and hollow tile, equipped with two stiff mud and brick machines. The clay used is the local silt of the valley, which is very fine and sticky, requiring much power to work it. This deposit continues unchanged to a depth of 1,500 feet, as shown by local borings, but varies slightly in texture and the proportion of sand present, the variations in composition occurring every 3 or 4 feet. This variation enables the brick maker to mingle layers of different qualities and form a brick mixture of suitable character.

Miocene Tertiary Clay. Near Coyote Mountain. F.J.H.M. Photo.

The plant is operated about 3 months in a year, and the production is about 4,000,000 brick and 200,000 hollow tile.

TERTIARY CLAYS.

Clays, many miles in extent and, perhaps, hundreds of feet in thickness, are found on the west margin of the valley toward Carrizo Creek. These clays have never been carefully sampled, but it seems reasonable to assume that, in them, strata will be found, suitable for various purposes.

GYPSUM.

This material, the hydrous calcium sulphate or sulphate of lime, is of much importance in construction as the calcined product, plaster of Paris, is the base of nearly all wall plasters for interior work. It also forms the base of the material known as staff which is so extensively used in the construction of temporary buildings for exposition purposes. Gypsum is also important as a fertilizer in supplying lime and in correcting alkaline soils. In small quantities, it is used in the manufacture of Portland cement to retard its setting.

Miocene Tertiary Clays. East Side of Coyote Mountain. F.J.H.M. Photo.

The gypsum of Imperial County occurs mainly in an immense deposit some three miles in length from southeast to northwest, with an area of some 800 acres, which occupies a valley, among crystalline rocks, in the northwestern edge of the Fish Creek Mountains. This spur from the crystalline ranges of San Diego County, as shown by the geologic map, lies chiefly in townships 13 and 14 south, ranges 9 and 10 east. The gypsum outcrops are in Sections 19, 20, 28 and 29, T. 13 S., R. 9 E. It has not been thoroughly explored by boring to determine its depth but, from the exposure in ravines, its average thickness is estimated at 100 feet. This is claimed by the owners to be the largest deposit of pure gypsum on the Pacific Slope.

The following analysis made by J. O. Handy, of Pittsburg, Pa., is furnished by one of the owners:

Silica	.92
Alumina	.21
Iron protoxide	.14
Lime	32.75
Magnesia	.08
Sulphur trioxide	47.17
Water	18.73

The ownership of this deposit is distributed as follows:

Acres	Location	Owner
120	SE. ¼, SW. ¼; S. ½, SE. ¼; Sec. 19	Bert R. Chaplin, Suisun.
120	SE. ¼, NW. ¼; N. ½, SW. ¼; Sec. 20	S. L. Ward, San Diego.
160	SE. ¼, SW. ¼; SW. ¼, SE. ¼; Sec. 20 NE. ¼, NW. ¼; NW. ¼, NE. ¼; Sec. 29	Walter O. Hamilton, El Centro. L. E. Cooley, El Centro.
80	E. ½, NE. ¼; Sec. 29	W. H. Allen, San Diego.
40	NW. ¼, NW. ¼; Sec. 28	Sam C. Mack, Imperial.
40	SW. ¼, NW. ¼; Sec. 28	Ed H. Houck, Imperial.
80	NE. ¼, NW. ¼; NW. ¼, NE. ¼; Sec. 33	David Chaplin, Suisun. W. L. Gillette, Holtville.
	The above are all patented under the timber and stone act.	
160	NE. ¼, SW. ¼; NW. ¼; SE. ¼; Sec. 28 S. ½, SE. ¼	C. H. Swallow, San Diego.

None of these are patented.

Gypsum Outcrop. Fishcreek Mountain.

This deposit must necessarily become of great importance as soon as it is accessible to transportation. The new line of the San Diego and Arizona Railroad will pass within about 25 miles, and this will be rather too great a distance to haul a product of moderate value. Should the Atchison, Topeka and Santa Fe Railway build its contemplated line near the old highway from San Felipe through Carrizo Creek, the problem will be in a large measure solved.

Situated on the south slope of the Coyote Mountain range is another deposit of gypsum covering the better part of 10 acres. It is exposed over most of this area, has an average depth of 8 feet, and is said to show by measurements about 84,000 tons in sight, with a continuation under the overcap that can not be determined. The quality is said to be the same as that of the larger deposit to the north. This deposit lies about 3 miles northwest of Coyote wells and could be easily worked.

Gypsum Outcrop. Fishcreek Mountain.

GEMS.

The gem deposits so abundant in San Diego County are not found in Imperial County. Although pegmatite dikes occur at many points in the metamorphic rocks they do not contain the gem bearing veins. Further, the garnetiferous limestones of the Jacumba region do not extend east of the San Diego border.

A few peridots of good quality have been reported from the gravels of the Picacho region. On the slopes of Signal Mountain just across the Mexican boundary a few small turquoise have been found. From the region along the San Diego border some small diamonds are reported but this has not been confirmed.

PETROLEUM.

This important fuel has been sought by boring on the west side of Imperial Valley, but without result.

While Miocene beds are present in this valley it would appear that the conditions under which they were deposited were not specially favorable to oil formation.

The principal well was the Yuha, Sec. 32, T. 16 S., R. 11 E., drilled by the Yuha Oil Company, Chas. Swallow, of San Diego, secretary-treasurer. It reached a depth of 1,363 feet, but without result. Another well was the Mesquite, about 850 feet deep, in Sec. 27, T. 12 S., R. 10 E. This brought a supply of flowing water.

The Barrett well drilled near Carrizo Creek, to a depth of 1,100 feet, was also unsuccessful.

SALT.

Bull. 24.

An extensive deposit of salt was formerly worked near Salton, Riverside County, and if the Salton Sea should again become dry, salt may be found in this basin, within Imperial County.

NITRE.

Bull. 24.

Some years ago some claims were located near Volcano Station on deposits supposed to contain Nitre, but it does not appear that anything more important than traces of this material were discovered.

SULPHUR.

There is a small exposure of this mineral on the east slope of Coyote Mountain. A claim has been located by Chas. Swallow of San Diego.

Desert Springs and Wells.

The following list is taken from U. S. G. S. Water Supply Paper No. 224 by W. C. Mendenhall from data of G. E. Bailey.

"*Soda Springs.*—These are about 15 miles southeast of Fish Springs, on the road from Mecca down the west side of the Colorado Desert. The water is so salt as to be scarcely potable and near by are other springs whose water is entirely undrinkable. Soda Springs are at the base of a low barren knoll, one-half to three-quarters of a mile south of Clay Point, marked by a government bench mark, around which the road turns west on the way from Mecca to Seventeen Palms Springs. The road from Clay Point south toward Harper Well is very little traveled and is difficult to find.

"*Fish Springs.*—Fish Springs (230 feet below sea level), in 1908 submerged to a depth of about 25 feet beneath Salton sea, are a group of strong natural springs whose aggregate yield is several miner's inches. The waters are tepid and slightly saline, but of sufficiently good quality to be used by men or animals without injurious effects. Before their submergence, these springs were especially important to travelers because they were at the southernmost point at which water of fair quality can be procured in abundance along the west side of the desert until Harper (Mesquite) Well is reached. They will emerge again as the lake shrinks by evaporation, and when the lake water has become too saline for use they will again become important. Their position is indicated by a prominent rocky point which stands out in a desert about a mile east of the Santa Rosa Mountains, and which is conspicuous not only because of its position but because of the distinct water line that encircles it 10 to 15 feet below its summit. This point is about 2 miles northeast of the springs.

"*Frinks Springs.*—These are about 6 miles northwest of Frinks Station, on the Southern Pacific Railroad. They are on one of the old wagon roads from San Bernardino to Yuma, near the old beach line that stands about 40 feet above sea level in the Colorado Desert. The water is of good quality and in fair quantity.

"*McCain Springs.*—These springs are about 5 miles somewhat east of south of Clay Point, mentioned in the description of Soda Springs. They are in the center of a broad wash, locally called Arroyo Grande, and are marked by three large sand dunes from a quarter of a mile southwest. The surrounding country is traversed by numerous gulches from 6 to 20 feet in depth and often difficult to cross. The springs, which are well below sea level, have built up a small mound in the bed of the wash. The water appears to be charged with carbon-dioxide gas and is fairly palatable.

"*Harper* (or Mesquite) *Well.*—Near the junction of Carrizo and San Felipe creeks an attempt was made some years ago to develop oil. No oil was found, but at a depth of about 300 feet a flow of good water was obtained. The site of the well is plainly marked by the derrick, which can be seen for a long distance across the plain. There is an abundance of mesquite timber in the vicinity.

"*Kane Spring.*—This is 6 miles east of Harper Well, on top of a low knoll. It is surrounded by cane, salt grass, and arrow weed. The water is full of soda and is very poor, being hardly fit for use.

"*Coyote Well.*—This well is about 375 feet above sea level, on the main stage road from Mountain Springs to Dixieland. The old Coyote well was a mere pit curbed up with planks. A new well, standing about 100 feet from the old one, was fitted up with a pump. The water is rather alkaline, but improves after the well has been used for some time.

"*Yuha Springs.*—These springs are located in a wash near the corner of sections 5, 6, 7, and 8, about 5 miles southeast of Coyote well and a mile southwest of the derrick at the Yuha oil well. The stage road from San Diego to El Centro passes about 2 miles north of the springs. The water is impregnated with alkaline matter, but when used continuously is not unpleasant or harmful. In 1905 there was a trough and pump at the springs.

"*Sunset Springs.*—These springs, which have long been known, are about 13 miles south of east from Brawley, below the old beach which is so prominent a feature about the borders of the Colorado Desert. They are of less importance now than before the reclamation of so large a part of the Imperial Valley by irrigation with Colorado River waters."

BIBLIOGRAPHY.

Articles on San Diego and Imperial Counties in Publications of the State Mining Bureau.

Date	Author	Subject	Volume California State Mining Bureau	Pages
1882	H. G. Hanks	Colorado Desert	2d Report.	
1885–6	H. G. Hanks	Gold Mining	6th Report, Part I	80–90
1887	W. A. Goodyear	Petroleum	7th Report	97
1887	W. A. Goodyear	Coal	7th Report	177–178
1888	W. A. Goodyear	Gold Mining	8th Report	512–516
1888	W. A. Goodyear	General Description	8th Report	516–528
1889	W. A. Goodyear	Gold Mining	9th Report	139–154
1890	H. I. Willey	Geologic Map	10th Report	21–22
1890	E. B. Preston	Gold Mining	10th Report	540–544
1890	C. R. Orcutt	Colorado Desert	10th Report	899–919
*1892	H. W. Fairbanks	Geology	11th Report, First Biennial	76–120
1892	W. H. Storms	Gold Mining	11th Report	376–387
1892	E. B. Preston	Salton Lake	11th Report	387–393
1894	W. H. Storms	Gold Mining	12th Report, Second Biennial	237–243
1896	W. H. Storms	Gold Mining	13th Report, Third Biennial	331–347
1901	Stephen Bowers	Reconnaissance of Colorado Desert Mining District	Bulletin	5–19
1902	E. Hubon		Register of Mines and Minerals, San Diego County.	
1902	G. E. Bailey	Saline Deposits	Bulletin No. 21.	
*1905	Geo. F. Kunz	Gems, Jewelers' Materials and Ornamental Stones	Bulletin No. 37.	
1906	Various	Structural and Industrial Materials	Bulletin No. 38.	
*1908	Various	Copper Resources of California	Bulletin No. 50.	

*Now on sale.

N. B.—All of the above publications contain references to Imperial County, as they were issued before it was separated from San Diego.

PART VI.

The Counties of

Shasta, Siskiyou, Trinity

By G. CHESTER BROWN, Field Assistant.

INTRODUCTION.

The three counties presented herewith are situated at the extreme north end of the State, and midway between the eastern and western boundary counties. They thus include the upper end of the Sacramento Valley, with its northernmost tributaries, also portions of both the Sierra Nevada Mountains on the east and the Coast Ranges on the west, the two systems forming a junction at Mount Shasta in Siskiyou County. Lassen Peak which has recently been attracting attention by its renewed volcanic eruptions is in southeastern Shasta County.

The drainage systems of western Siskiyou and Trinity counties are tributary to the Klamath and Trinity rivers which flow direct to the Pacific Ocean. This western drainage area is the only district in California where hydraulic mining is still active on any considerable scale, because of the silt question not affecting any navigable streams.

Though the central part of this section of the State is traversed north and south by a transcontinental railroad line, the greatest drawback to the development of the three counties in question is lack of transportation facilities. This is particularly true of the distinctly mineral areas, in the rugged, western mountains. In addition to the mineral output, lumbering and stock raising are important industries.

Acknowledgment is here made of assistance rendered by the various owners and operatives of properties, both during the field work and in the subsequent preparation of this report.

SHASTA COUNTY.

Field Work in November, 1913.

INTRODUCTION.

Shasta County, noted since 1896 for its copper resources, has an area of 4050 square miles, and lies in the mountainous regions at the head of the Sacramento Valley. It is bounded on the north by Siskiyou, on the east by Lassen, on the south by Plumas and Tehama, and on the west by Trinity County, and derived its name from Mount Shasta, which, when the county was organized, stood within its limits. In 1852, when Siskiyou County was created, it was made to take in that portion of Shasta which contained this mountain, thereby depriving the county's name of its significance and fitness.

The western border of the county is along the Trinity Range summit, and the county reaches eastward high up the slope of the Sierra Nevada Range, which bears westward and merges with the Coast Range in Shasta and Siskiyou counties. Short irregular ranges cover the greater part of the county between the main ranges to the east and west.

In the southeastern corner is Lassen Peak, an old volcanic cone, which has exhibited true volcanic activity since May 30, 1914. In the bowl of the much eroded old crater a series of steam explosions have opened a new vent, and from it stones have been thrown over an area more than one half mile in diameter, and ejected volcanic ash has been wind-borne in sufficient quantities to make a perceptible deposit at a distance of fifteen to twenty miles. No freshly molten lava has been seen and no heat has been noticeable except that of escaping steam. Sulphur fumes and slight sulphur deposits near the vent have been noticed by nearly all observers. On June 28, 1914, the new crater was estimated to have a length of 400 feet. (See photos No. 1 and No. 2.)

"A heavy eruption took place on June 14th, and two new craters opened up a mile from the main hole. A shower of ash and stones fell from the craters and the smoke rose to a height of 5000 feet." (Report of J. M. Stark, United States Forest Service Lookout on Mount Turner.)

That volcanic activity is not yet extinct in the Lassen Peak district is shown by the presence of numerous solfataras and hot springs. At Bumpass' Hell, near the southern base of the peak, there are boiling mud pools and occurrences of vigorous solfataric action. Near by, at the head of Mill Creek, the sulphur deposited by such action is so abundant that attempts have been made to mine it.

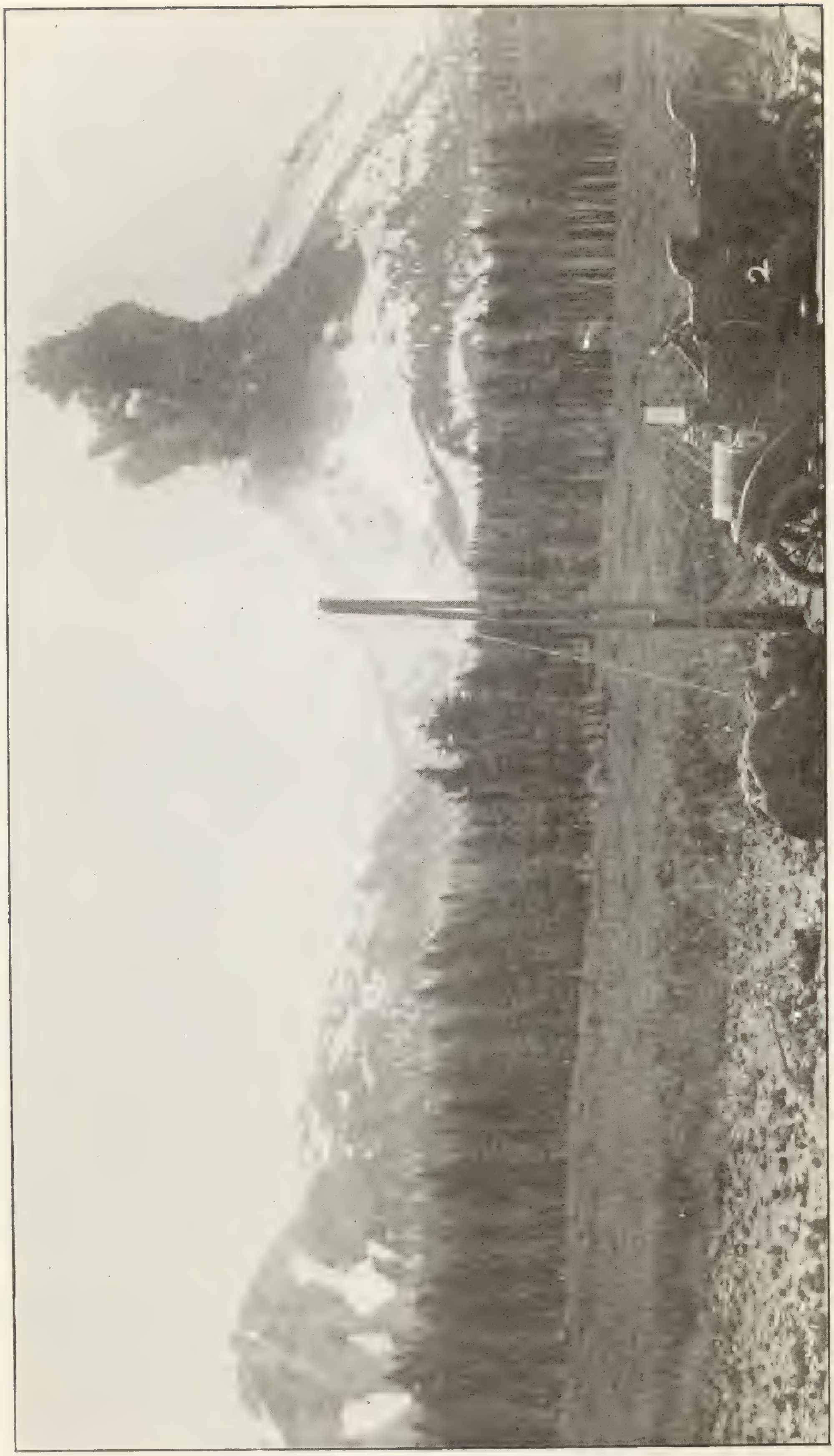


Photo No. 1. Lassen Peak, eruption June 14, 1914, at 9:45 a.m.

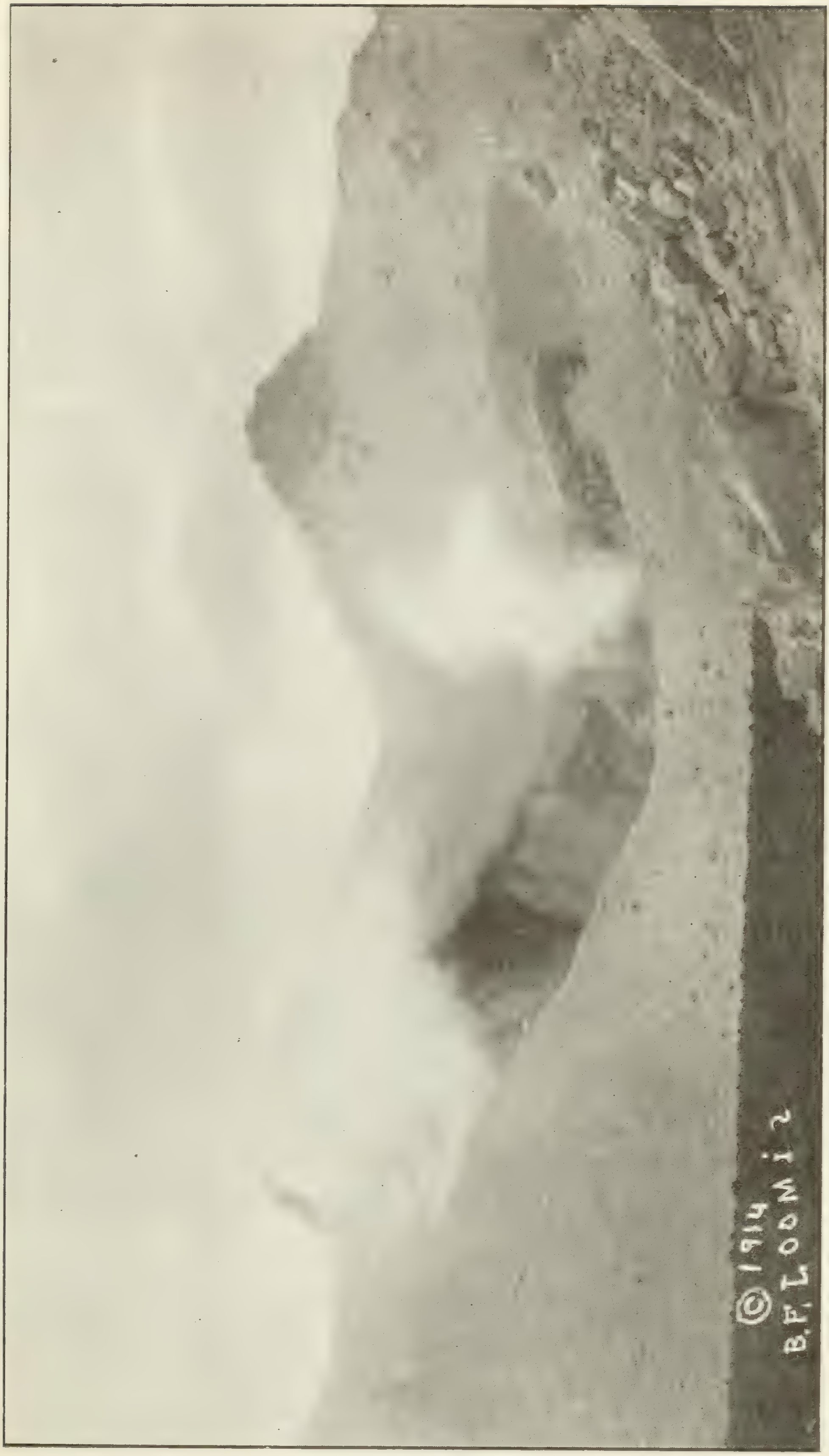


Photo No. 2. Lassen Peak, new crater, 400 feet long, June 28, 1914.

Lassen Peak has four distinct summits, the highest having an elevation of 10,527 feet. During a period of activity a few hundred years ago the lava from this mountain blanketed the eastern portion of Shasta County as far as the Sacramento River.*

Water Resources. Shasta County has a splendid water supply. The rainfall, occurring chiefly in the winter, exceeds forty inches as a rule, and the snows of the higher ranges maintain the streams throughout the summer months.

The Sacramento, McCloud and Pit, the principal rivers, afford valuable power resources. The first two of these rise in the mountains above the northern boundary, while the last has its source in Modoc County. The Sacramento flows southward through the western half of the county in a deep, sinuous and picturesque canyon, crossing the copper belt near the apex of the Sacramento Valley plain. The torrential Pit crosses the axis of the Sierra Range through heavy forests and deep canyons and joins the Sacramento in the midst of the copper belt. The McCloud discharges into the Pit amid the gossan cappings of the copper deposits. Thus there is a general convergence of the important rivers and streams of the county in and through the chief mineral region.

Timber Supply. The timber supply of Shasta County in the higher ranges is excellent, but in other sections adjacent to the mining districts, the supply is generally limited, although on some of the higher ridges yellow pine is found in considerable abundance.

Transportation Facilities. The California and Oregon branch of the Southern Pacific railway system crosses the county and affords direct transportation facilities for the copper belt along the course of the Sacramento River.

The Mountain Copper Company operates a narrow gauge railroad between the mine and Keswick Station. This road is eleven miles long and extremely tortuous in its course, descending a grade of nearly 2000 feet between the mine and its terminus.

The Sacramento and Eastern, a standard gauge railroad owned by the General Electric Company, connects the Bully Hill Mine with Pit station on the Oregon branch of the Southern Pacific Railroad. This road is about fourteen miles long.

The Delta Consolidated railroad, owned by the Delta Consolidated Mining Company, connects Delta, a station on the Oregon branch of the Southern Pacific Railroad, with the mine. This narrow gauge road is seven miles long.

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*Bibl.: Lassen Peak Folio, U. S. Geol. Surv., 1894; University of California, publications in Geography, August 7, 1914; Mining and Scientific Press, Vol. 109, p. 143.

SHASTA COUNTY—Table of Mineral Production.

Year	Brick		Chrome		Copper		Gold	Lime		Limestone		Mineral water		Pyrites		Silver	Miscellaneous and unapportioned	
	Thousand	Value	Tons	Value	Pounds	Value	Value	Barrels	Value	Tons	Value	Gallons	Value	Tons	Value	Value	Kind	Value
1880	----	----	----	----	----	----	$140,455	----	----	----	----	----	----	----	----	$117,907		
1881	----	----	----	----	----	----	350,000	----	----	----	----	----	----	----	----	85,000		
1882	----	----	----	----	----	----	300,000	----	----	----	----	----	----	----	----	80,000		
1883	----	----	----	----	----	----	210,000	----	----	----	----	----	----	----	----	20,000		
1884	----	----	----	----	----	----	320,000	----	----	----	----	----	----	----	----	30,000		
1885	----	----	----	----	----	----	417,004	----	----	----	----	----	----	----	----	9,223		
1886	----	----	----	----	----	----	699,508	----	----	----	----	----	----	----	----	10,647		
1887	----	----	----	----	----	----	627,681	----	----	----	----	----	----	----	----	40,204		
1888	----	----	----	----	----	----	600,000	----	----	----	----	----	----	----	----	50,000		
1889	----	----	----	----	----	----	415,631	----	----	----	----	----	----	----	----	5,396		
1890	----	----	----	----	----	----	420,530	----	----	----	----	----	----	----	----	7,279		
1891	----	----	----	----	----	----	554,063	----	----	----	----	----	----	----	----	7,432		
1892	----	----	----	----	----	----	574,833	----	----	----	----	----	----	----	----	7,977		
1893	----	----	----	----	----	----	500,407	----	----	----	----	----	----	----	----	8,577		
1894	----	----	1,200	$16,800	----	----	617,436	----	----	----	----	150,000	$75,000	----	----	5,032	200 tons iron ore	$1,500
1895	----	----	90	1,120	----	----	718,696	----	----	----	----	----	----	----	----	28,417		
1896	300	$1,500	----	----	1,847,087	$184,708	599,209	2,310	$2,541	----	----	----	----	----	----	24,233	Stone industry	1,400
1897	1,200	7,200	----	----	13,592,610	1,535,966	569,071	2,100	2,100	9,000	$13,500	----	----	----	----	96,869		
1898	1,200	7,200	----	----	21,442,000	2,465,830	860,180	2,500	3,750	----	----	3,000	2,000	----	----	171,768		
1899	2,000	14,000	----	----	21,835,863	3,565,023	873,719	8,000	10,000	250	375	5,000	1,850	----	----	196,213	100 squares, slate Stone industry	800 375
1900	2,000	12,000	140	1,400	25,736,473	4,166,735	733,467	17,850	17,850	1,150	1,150	9,640	5,784	----	----	635,640		
1901	3,000	12,000	130	1,950	30,990,781	4,881,048	927,975	21,600	12,960	----	----	26,295	7,644	----	----	891,994	Stone industry	2,000
1902	2,450	12,250	315	4,275	21,515,887	2,496,731	878,706	18,500	12,500	3,500	3,600	26,295	7,645	3,202	$7,005	306,887		
1903	3,500	17,500	150	2,250	16,453,409	2,171,497	771,242	27,000	10,800	5,400	5,400	40,000	12,000	2,500	5,500	203,991	Stone industry	1,500
1904	3,000	15,000	98	1,470	26,438,145	3,439,974	1,031,429	18,000	10,500	----	----	----	----	----	----	399,660	Unapportioned, 1900-1909	47,723
1905	3,500	14,000	20	300	10,830,865	1,688,614	684,952	10,700	8,000	3,600	3,600	80,000	12,000	----	----	167,548		
1906	4,400	22,000	80	1,200	22,477,304	4,338,121	819,144	12,860	8,040	27,000	32,960	----	----	32,689	89,895	434,483		
1907	4,500	33,000	260	5,200	27,844,364	5,568,873	791,997	29,222	31,900	30,761	30,761	----	----	65,788	197,364	370,211	400 tons iron ore	400
1908	2,000	12,000	280	5,600	34,878,677	4,642,976	1,131,832	11,818	9,100	80,000	80,000	100,000	20,000	93,677	539,553	517,596	Stone industry	25,000
1909	3,500	23,500	205	3,517	58,665,447	7,581,115	1,600,489	8,650	8,000	129,560	134,595	100,000	20,000	449,762	1,349,286	735,460	108 tons iron ore Stone industry	174 4,688
1910	2,425	17,548	680	9,155	44,947,950	5,725,469	1,533,728	16,616	14,114	117,109	117,083	40,000	10,000	31,683	126,692	648,905	579 tons iron ore 1,859 pounds lead	900 86
1911	2,825	20,004	875	13,697	29,539,913	3,692,489	*1,059,881	13,271	10,164	67,924	65,253	25,000	6,250	47,885	151,602	386,991	881 pounds lead	40
1912	1,697	10,195	1,000	8,000	25,249,892	4,166,232	986,803	6,529	3,548	58,022	45,575	23,225	5,646	62,605	174,402	425,382		
1913	360	4,330	280	2,800	27,686,436	4,291,708	1,208,870	8,595	7,030	41,346	35,616	30,000	6,850	72,071	194,409	448,031	47 tons asbestos 19,070 pounds lead Other minerals	1,175 836 10,686
Totals	43,857	$255,317	5,803	$78,734	461,973,103	$66,603,109	$24,528,938	236,121	$182,897	574,622	$569,468	658,455	$192,669	862,762	$2,835,708	$7,574,953	----	$99,283

*Dredge production included in Stanislaus total.

Totals.

Brick	$255,317
Chrome	78,734
Copper	66,603,109
Gold	24,528,938
Lime	182,897
Limestone	569,468
Mineral water	192,669
Pyrite	2,835,708
Silver	7,574,953
Miscellaneous and unapportioned	99,283
Total to end of 1913	$102,921,076

Good wagon roads serve the outlying territory from the Southern Pacific Railway.

Mining Industries. Shasta County is identified with the State's early mining activity, this industry, however, being practically confined to the western third of the county, for the eastern half is buried, as a rule, under lava deposits, which effectually hide the minerals that undoubtedly exist.

In that portion of the county west of the Sacramento River, the early placers were rich and extensive, and recent and ancient auriferous gravel deposits remain, affording opportunities for various forms of placer mining, including gold dredging, which is being pursued near Redding.

Hydraulic mining operations are very limited, due to the State débris law, as Shasta is one of the counties affected by this act.

Quartz mining was of slow development, owing to the base character of the ores in most of the districts in which gold-bearing veins were early discovered.

Copper mining has received a setback due to the fume agitations and lawsuits resulting therefrom, yet a solution of this problem is looked for in the near future, as experimental plants are now being erected which should eliminate the trouble. The Mammoth was the only smelter in operation in Shasta County in 1913.

The smelting of iron ore with hydroelectric energy, as practiced at Heroult on the Pit, is focusing the interest of the industrial world. The work has been done on a large and practical scale and results are of a definite nature.

Climatic Conditions. Shasta County has a wide range of climatic conditions, due to the difference in altitude from the valley floor, approximately 500 feet above sea level, to over 10,000 feet. Agriculture is pursued in the valleys and foothills, and a diversity of soil products grown.

Mineral Resources. Its mineral resources consist of gold, silver, copper, zinc, iron, chrome, barite, asbestos, coal, limestone, cement materials, clays, marble, granite, and mineral waters.

Shasta County in 1913 was first in the production of copper, silver and pyrite, third in lead, and sixth in gold. This county ranked fourth in the total mineral production of the State, but exclusive of petroleum, leads all others.

HYDROELECTRIC PLANTS.

The Northern California Power Company Consolidated, organized in 1900, is one of the large power distributing concerns of California. This company has seven generating stations, all in Shasta County, connected with its distributing system, as follows:

	Station capacity, h.p.
Coleman	20,000
Volta	8,500
Kilarc	8,000
Inskip	8,000
South Power House	6,500
South Cow Creek	2,000
Snow Creek	1,600
Total	54,600

The water resources of the Battle Creek drainage, in the main, supply its present requirements. The transmission system is modern in every respect, and some 970 miles of line distribute power throughout Shasta, Tehama, Glenn, and into portions of Trinity, Butte and Colusa counties. A reservoir is being constructed at the head of Burney Creek with a capacity of 30,000 acre feet.

ASBESTOS.

The holdings of Stock & Stevens are being developed in a systematic manner and considerable asbestos of a commercial grade is blocked out. This group, consisting of 1100 acres, is situated in Secs. 1, 2, 3, 4, 33, and 34, T. 37 and 38 N., R. 5 W., in the Trinity Forest Reserve, and about 3 miles east of Sims Station. The elevation varies from 3500 to 6300 feet. Mears Creek runs through the property. The croppings have been opened up in places for a distance of 13,500 feet (see photos Nos. 3 and 4). The country rock is principally serpentine, through which numerous dikes of diorite and gneiss have been thrust. This serpentine carries chrysotile asbestos, both slip and cross fiber, hornblende amianthus (Italian floss), amphibole, and mass fiber of all kinds. One deposit of chrysotile is 270 feet long, 100 feet high, and probably over 400 feet wide on the surface. There are four chrysotile quarries, the cropping faces being 100′ to 500′ in height, with no overburden. One ridge, 7000 feet long, a continuous chrysotile zone, can be worked by means of a steam shovel, from both sides. The average elevation of this ridge is about 6200 feet. A report on this asbestos deposit has been made by H. Leslie Parker (April, 1913). Mr. Parker states that ''on these claims is a wonderful development of actinolite, occurring in the cross fiber fissures, some of which are five inches or more in width and then decreasing in size to ribbon-like seams. The

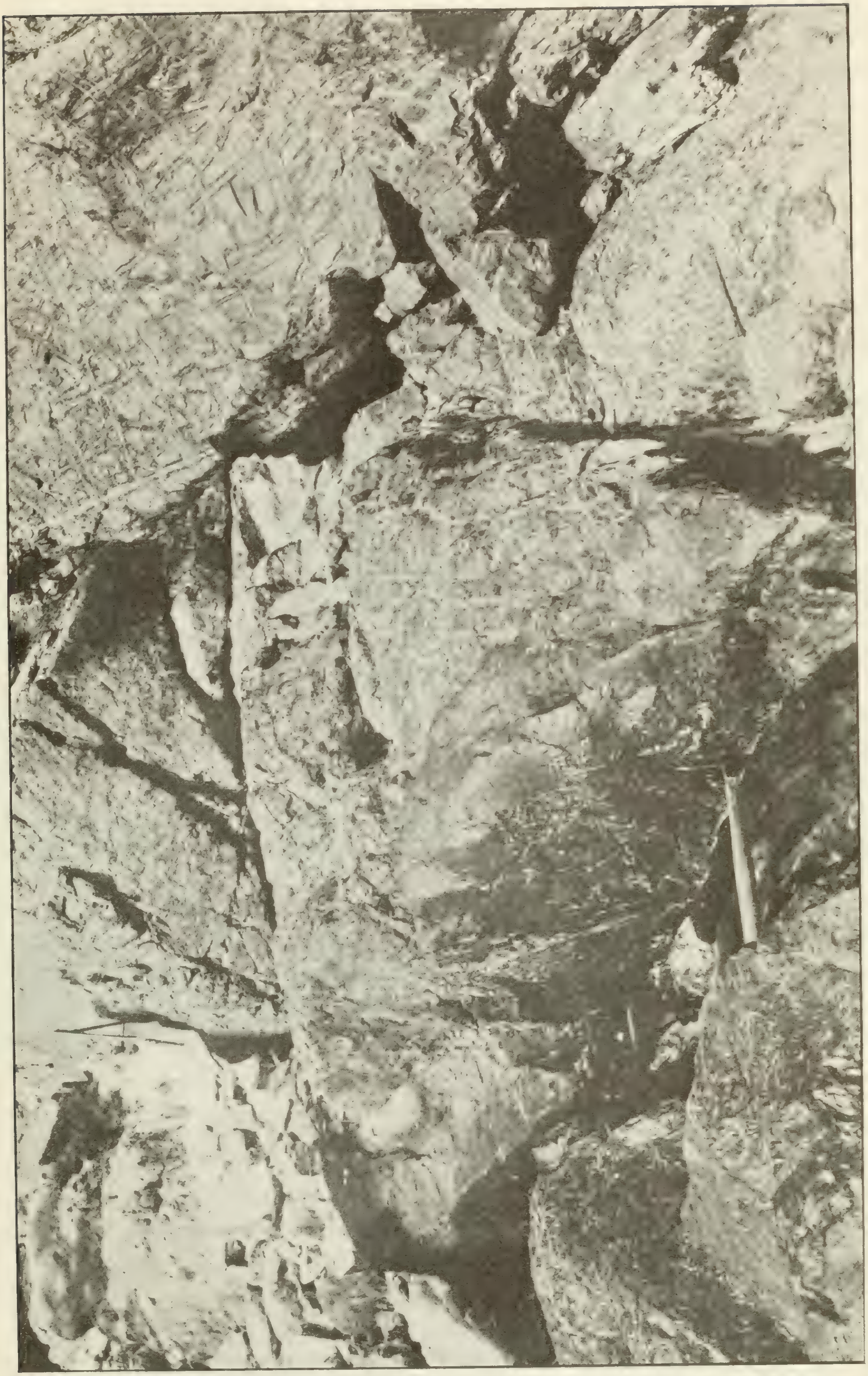


Photo No. 3. Stock & Stevens' asbestos quarry, croppings of chrysotile.

structure of this actinolite is similar to that of cross fiber chrysotile. In the creek bottom is shown cross fiber chrysotile of superior quality and is associated with slip fiber chrysotile, which occurs on the slickensided fractures caused by the rock movements. The claims on the whole are covered with a growth of excellent yellow pine, suitable for all mining, milling and tramway purposes. Hydroelectric power can be cheaply developed on Mears Creek, sufficient for very extensive mining and milling operations.''

Investigations made to determine the quality of this asbestos by the Eaton-Philbrick laboratories show ''that it is of the best quality, and that it is well adapted to any of the many uses to which asbestos has been put. The amphibole especially is recommended as a filter material, as it is easily worked up to the desired degree of fineness, gives a good yield of the finished product, and makes a firm close felt. The chrysotile fiber is of good tensile strength and very flexible. It also makes good filter material if extra long fiber is desired.

Photo No. 4. Stock & Stevens' asbestos quarry, chrysotile deposit.

''Sample marked, Amphibole-White fibrous. Fire test: Fibrous material submitted to heat of furnace up to 2500 degrees F. showed no signs of fusion. Acid test: Prolonged action of hydrochloric and sulphuric acids had no appreciable effect on this material.

"Sample marked, Slip Material. Fire Test: This material was shredded and put into the furnace and heated to 2500 degrees F. No signs of fusion were observed even on the finer fragments. The original material being very brittle in itself it can not be said that this heating had any effect at all."

An excellent exhibit of asbestos from the Stock & Stevens quarry is on display in the State Mining Bureau's museum, San Francisco.

Anaconda, asbestos deposit consisting of 120 acres, is located in Sec. 6, T. 37 N., R. 4 W., about 4 miles north of Sims Station. It is owned by the Pacific Coast Asbestos Company, A. Boldeman, president; office, Oakland. There are seven small veins on the claims, having an average width of 2 feet. Strike is north and south, dip 50° E. The asbestos occurs between a slate hanging-wall and a granite footwall. Development work consists of several open cuts. Idle.

D. E. Miles, 1515 Lafayette street, Alameda, reports asbestos on his land in Sec. 36, T. 38 N., R. 5 W., about 5 miles northwest of Sims Station. No development work has been done to prove the extent of the deposit.

CHROME.

Prim & Dougherty own three chromite claims in Secs. 13 and 24, T. 37 N., R. 5 W., near Sims Station. This chrome belt has been opened up for a length of over 1000 feet. The ore is lustrous black, carrying a high percentage of chromic oxide; it lies in serpentine, in lenticular form. The workings consist of short tunnels, and a 30-foot shaft with 8 feet of ore on the bottom. About 1500 tons of ore extracted from the original discovery on the north of Shotgun Creek. The chromite is shipped to Colorado, Montana and Arizona, and has been used for furnace bottoms at the Bully Hill and Keswick copper smelters. Prim & Dougherty own another claim in Sec. 22, T. 37 N., R. 5 W., on which very little development work has been done and from which no ore has been shipped.

Bibl.: Bull. No. 38, pp. 270, 271, 362.

Little Castle Creek in Sec. 2, T. 38 N., R. 4 W., near the boundary line between Shasta and Siskiyou counties. Owner, L. H. Brown, of Dunsmuir. Holdings consist of 80 acres, located in 1906. Deposit worked by open cuts. Equipment consists of a short tramway and dwelling. Production to end of 1913, about 2400 tons. Four men employed.

Holden et al. of Lamoine own eight claims in Sec. 22, T. 37 N., R. 5 W. Only a small amount of development done, so prospective value can not be determined.

CLAY PRODUCTS.

The Sacramento River Valley bottom, below the mountains, contains extensive clay banks, and on the higher table lands debris accumulation has in places formed clay deposits.

Alata Lime and Brick Company, formerly known as Coleman & Hill, owns the clay bank in Block 29, Redding Grant, about 1¼ miles south of Redding, in the Sacramento River bottom. The clay is 6 feet thick, the upper 4 feet being plastic, which grades into and rests upon a bed of sand, underlaid in turn by gravel; color is tawny. In former years a great many bricks of good quality were burned in this yard.

Bibl.: Bull. No. 38, p. 256.

Holt & Gregg of Redding own a clay deposit in Sec. 17, T. 30 N., R. 4 W., in the town of Anderson. The holdings consist of 200 acres, patented. Another deposit owned by this firm is 2 miles north of Anderson, near the railroad. This clay bed is 15 feet thick and worked by means of open cuts. Equipment for making bricks consists of grinding mill, brick kiln of a capacity of 40,000 bricks in seven hours, cars, etc. The stack is 120 feet high, with 12 feet diameter at base and 8 feet at the top. Cost about $4.50 per thousand to manufacture the brick, which are used for buildings in Redding and other towns in the Sacramento Valley. Fifteen men employed at present. Plant operated upon demand.

This firm also owns a good deposit of fire clay in Sec. 34, T. 34 N., R. 5 W. Used in limekilns for lining.

Bibl.: Bull. No. 38, p. 257.

R. L. Reading owns an extensive clay deposit in the Reading Homestead, east of Cottonwood. This deposit, on the Sacramento River, is 1 mile long and ¼ of a mile wide. The clay is 30 feet thick, capped by 15 feet of gravel. It has not been developed.

Southern Pacific Railway Company owns a clay bed in Sec. 19, T. 32 N., R. 4 W. This deposit covers about 40 acres, and is topped with gravel. It is undeveloped.

Redding Brick and Tile Company owns 40 acres, patented, in Sec. 19, T. 31 N., R. 5 W., 3 miles southwest of Redding. Small kiln at Redding. Idle. Operated upon demand.

Bibl.: Bull. No. 38, p. 257.

COAL.

A bed of coal in Sec. 20, T. 33 N., R. 1 W., M. D. M., has been prospected to a limited extent by M. Kincaid, but the quality is poor, due to the presence of slate. The total thickness of this bed is 15 feet and is often traversed by sheets of slate and clay. It is of late origin geologically speaking, and the dip is practically horizontal. It would not pay to work. Coal croppings are found in other localities near this section, especially on Secs. 3, 7, 8, and 21, T. 33 N., R. 1 W., and also on Sec. 12, T. 33 N., R. 2 W. Very little work has been done and no coal has yet been found that could be mined at a profit.

Bibl.: Reports VII, pp. 190, 191; XI, p. 29.

A body of coal-bearing strata of recent origin is noted in the eastern part of Shasta County, among the western foothills of the Sierra Nevadas, about T. 37 N., R. 1 E., M. D. M. This deposit, covering several townships, consists of strata of soft and unaltered shales and sandstones, having a thickness of about 150 feet, and are spread out unconformably over the upturned edges of the metamorphic gold-bearing slates which form so large a part of the mass of the Sierras.

COPPER.

Description of copper belt. (Extract from Bulletin No. 50.) The crescent-shaped copper belt of Shasta County has a length of approximately 30 miles, and a width of from ½ to 4 miles. The city of Redding, near its western end, is a little south of the chord of the arc described by the belt, while Iron Mountain and the Furnaceville district are the western and eastern ends, respectively, of the horn. The ore deposits occur as disconnected masses, or groups of vein formations, forming individual lodes and districts, and not as a continuous fissure system. These groups of deposits vary both in form of occurrence and in mineralization, being massive, lenticular beds of sulphides on the west, while the eastern half of the belt consists of irregular vein systems, the entire length being marked by massive exposures of gossan which cap its mineralized formations. These croppings of iron oxide and sulphide stand out boldly on the elevations, especially on Iron Mountain, the westerly end of the copper belt. Southerly from Iron Mountain only two or three known copper deposits occur, widely separated, the mineral formations of the belt being succeeded through the adjacent regions by gold quartz veins.

The belt intersects the Sacramento River in Sec. 36, T. 34 N., R. 5 W., M. D. M., at the point where it receives the Pit, and for 10 miles eastward it exhibits its gossan croppings on both sides of the latter stream, being bolder, however, on the north side. The McCloud River empties in the Pit about 4 miles east of the Sacramento, thus terminating in the midst of the copper belt. The Pit enters the belt farther eastward, and many of the tributaries to this stream and the Sacramento cross it; numerous gulches diminish its apparent continuity, the gossans here and there having been eroded away or covered by surface wash.

The ores all carry gold and silver, with a low percentage of the baser metals, zinc, antimony, lead, etc.; the values as a rule are higher in the central and eastern districts of the belt than in the larger ore bodies developed to the west. Many of the important copper properties were originally worked for their gold and silver values remaining in the decomposed portions of the deposits near the surface above the copper sulphides which are now being developed.

Fluxing materials are plentiful and easily accessible, due to the quartz districts adjacent to and the large lime deposits in and near the copper belt.

An ample supply of wood and timber, abundance of water, suitable smelter sites, transportation facilities, and good climatic conditions, present many favorable features for copper mining and smelting.

The Mountain Copper, Mammoth, Bully Hill, Balaklala and Afterthought are the noted copper mines. Smelters have been erected and operated by these companies, but only one, the Mammoth, was in operation in 1913. The Mountain Copper plant has been dismantled and the ore is now shipped to their smelter near Martinez.

Outline of the Geology of the Copper Belt. (Extract from Bulletin No. 50.) The oldest sedimentary rocks are those of the Devonian age, which are found especially along the western districts extending northward from Clear Creek to the Big Backbone, and also east of the Sacramento River, in the vicinity of Baird. These rocks are metamorphic and include the limestones and their underlying slates, or schists, found near Kennett, Copley and Horsetown.

The Carboniferous represents the next succeeding period among the sedimentary rocks, and includes both limestones and slates. This period is represented by the conspicuous limestone belt east of the McCloud River, near Baird, and extending in a southerly direction beyond the Pit River.

The next oldest sedimentary rocks, succeeding the Carboniferous period, is represented by those of the Triassic age, which occur still farther east in the vicinity of Squaw Creek and Bear Mountain. They consist, for the most part, of silicious slates, overlain in some places by limestone which is usually very fossiliferous. The limestones to the north and east of Bully Hill belong to the Triassic period.

The igneous rocks are vitally connected with the ore deposits of the copper belt. The geological age to which they seem referable can not be younger than the Cretaceous nor older than the Triassic. Most of the rocks are of acid character, being high in the percentage of silica. In the main, igneous rocks seem to underlie all of the sedimentary rocks. Rhyolite, trachyte and andesite are names properly given to surface flows of volcanic rocks, and such flows occur throughout the copper districts, associated with tuffs and breccias of a similar age and character. These volcanic rocks, including both the flows and the fragmental rocks, are especially seen near Iron Mountain, the Shasta King, Bully Hill and Afterthought mines. Porphyry and diabase dikes occur in the belt also, the latter accompanying the iron ores. The copper belt, in the main structural features, consists of a number of north and south folds, or belts, of sedimentary rocks which belong to a succession of periods, and beneath which extend the rocks of the great granitic intrusions. Dike rocks have been found penetrating both the eruptives and the overlying sedimentary rocks.

ORE DEPOSITS.

The deposits of copper belonging to the Shasta belt are vastly different from the usual quartz veins as ordinarily understood, both as to their forms as ore bodies and as to their origin. These ore bodies, as a rule, are of great size, consisting of large bodies of massive sulphides occurring along the borders of or within areas of eruptive rocks. They are not often bounded along the sides by definite walls, though sometimes one wall is in evidence, emphasized as to its extent by a selvage of clay and other similar material showing a certain amount of either lateral or vertical movement. Evidence is lacking to show that such walls have had any connection with the genesis of the ore. The ore bodies fade out by gradual transitions from ore, in which there is more or less waste, to rock in which there is more or less ore, and finally into rock with only a small percentage of disseminated sulphides.

There are three classes of ore deposits within the copper belt. The first of these consists of depcsits of magnetic iron (magnetite) with pyrrhotite and pyrite, as represented north of the Pit River, and southeast of Baird, and the largest at the head of Potter Creek. The second class consists of massive deposits of pyrite, chalcopyrite and other sulphides, which form the principal deposits of copper ore lying west of the Sacramento River, and includes the ore bodies of Iron Mountain, Squaw Creek, Backbone Creek, etc. The third class, including vein-like deposits of mixed sulphides, and a relatively large percentage of gold, silver, zinc, antimony, etc., is represented by the ore bodies of Copper City, the Bully Hill, Afterthought, and other mines.

Residual accumulations of metallic oxides often form thin crusts of masses of ''gossan,'' or else only stain the rocks upon which it is deposited. The chief metallic element of the ''gossan'' is iron, though it very often contains a small percentage of copper, and it has often formed an ore of gold and silver, as in the Iron Mountain, Bully Hill and Afterthought mines.

The ''gossan'' at the Iron Mountain consists in many cases of crusts of limonite many feet in thickness, while at the Bully Hill the surface indications are very different, although the term ''gossan'' is likewise applied. Instead of crusts of limonite the surface at the latter is largely covered by broken and stained masses of rock, often light colored, but generally containing some metallic oxides.

COPPER MINES.

Afterthought, formerly known as the Peck, is located in the North Cow Creek mining district, in Secs. 10, 11, 15 and 5, T. 33 N., R. 2 W., M. D. M., in the Shasta Forest Reserve, and in the town of Ingot, which is 24 miles from Redding, the county seat. This group, consisting of 1650 acres, of which 1550 are patented, is owned by the Afterthought Copper Company, formerly known as the Great Western Development Company, S. E. Bretherton, president and manager; T. H. Adams, secretary; J. H. Bull, superintendent; F. L. Wilson, chemist. Home office, Indianapolis, Ind. The Copper Hill and the Afterthought claims hold the larger part of the ore body and are the main producers. The ore body is distinctly a contact deposit in a formation of marked schistose character, which is indicatory of severe metamorphic action, the richest ore being encountered where the greatest movement has taken place in the shales and stratified andesite. The contact is followed to a considerable depth, much of the best ore being mined from the lower levels.

Photo No. 5. Smelter, Afterthought Copper Mine.

There are two parallel veins, the Afterthought and Copper Hill, having a northwest and southeast strike, and a dip of 40° NE. Occurrence and shape of the ore resembles that of the Bully Hill. Workings consist of a main adit 2200 feet in length (nine tunnels in all), six levels, crosscuts, raises, stopes, 536-foot shaft and 230-foot winze, comprising in all several thousand feet of development work. Ore shoots have a length of 400 and a width of 25 feet. The ore is extremely refractory, containing, besides gold, silver and copper, a high percentage of zinc (sphalerite) and barium. The average ore carries 2.81% copper, 11.6% iron, 5.4% lime, 3% zinc, 20.25% sulphur, 18% silica, 5.3% alumina, 7.4% barite, and $4 per ton in gold and silver. Laboratory experiments are being made to endeavor to devise a method of working the high grade zinc ores.

The mine equipment consists of a 30-inch gauge railroad, 1 mile long from the mine to the smelter, Davenport steam locomotives, two 20 h.p. steam and one 30 h.p. electrical hoists, cages, air compressor, drills and all necessary buildings. The smelter plant, 1 mile below the mine in the town of Ingot, 150 tons daily capacity, was constructed in 1904 and operated until 1908, during which time the output averaged $350,000 yearly (see Photo No. 5). This plant consists of two blast furnaces, two hot blast stoves, blowers, pumps, sampling mill, crushers, storage bins, ore yards, shops, dwellings and offices, and one electrical substation, power being obtained from the Northern California Power Company. Company also owns the railroad from Anderson to Bella Vista (old Shasta Lumber Company's road), and supplies are hauled from Bella Vista to the plant, a distance of 12 miles. The cost of operating the smelter is heavy, so that only a high grade of ore can be handled. This property is on the eastern end of the copper belt, and was discovered in 1872 by James Peck, and after passing through several hands was acquired by the present owners in 1903. Worked at one time for gold only, as some of the oxide ore on the surface was very rich. Company claims a considerable tonnage of good ore in sight. During 1913 only five men were employed. Donkey mine adjoins this group on the east.

Bibl.: Bull. No. 50, pp. 102-105.

Arps, in Secs. 20, 21, 28 and 29, T. 34 N., R. 3 W., 1¼ miles north of Copper City, in the Pittsburgh mining district, consists of 250 acres in the Shasta Forest Reserve, adjoining the Copper City claims of the Bully Hill Mining Company. Owners are Arps & Saeltzer. Development work consists of five tunnels, from 350 to 850 feet long, and a 160-foot drift. Ore is base, carrying considerable zinc. Formation similar to the Bully Hill. Some good ore found on the surface. Arps, one of the owners, doing some development work. Prospect.

Bibl.: Bull. No. 50, p. 110.

Balaklala Copper Mine, consisting of 1149 acres, patented, is in the Flat Creek mining district, in Secs. 10, 11, 12, 13, 14, 17, 20 and 21, T. 33 N., R. 6 W., about 3 miles northwest of Coram Station. It is owned by the First National Copper Company, but is operated under the name of the Balaklala Consolidated Copper Company, T. W. Lawson, president; W. A. Kerr, secretary; F. M. Leland, general manager; D. S. Epperly, superintendent. Home office, New York. Property acquired in 1905 from the Western Exploration Company. The mines are located on the south side of Squaw Creek at an elevation of 2400 feet. The country rock is meta-rhyolite; several faults from 2 to 100 feet in width parallel with the strike of the ore bodies. Ore bodies consist of a hard, heavy iron sulphide, carrying chalcopyrite, a little galena, covellite and some gold and silver. Two large separate ore bodies are known, one near Mule Gulch, the other in the vicinity of Windy Camp. The eastern body, near Mule Gulch, was discovered by means of diamond drills and developed through the Weil tunnel, which has a length of 2400 feet. Raises were made through its entire thickness, and drifts run on both sides through the ore and the dimensions were found to be 1200 feet in length (east to west), 300 feet in width (north and south), and from 20 to 40 feet thick. The development work comprises several thousand feet of drifts, three crosscuts from 40 to 400 feet in length, eight levels, eight raises from 40 to 400 feet in height, tunnels and open cuts. Ore is blocked out in 25-foot sections from the Weil tunnel. The other deposit, Mule Gulch, is over 900 feet long and 20 to 60 feet thick. Ore is reported to run: gold .025 oz.; silver .85 oz.; copper 2.46%; silica 23.5%; iron 29.8%. Equipment consists of 16,500 feet of aerial tramway to bring ore from mine to smelter, 3 miles of telephone line, and all equipment necessary to operate a large mine. The smelter plant, some 3 miles from the workings, at Coram, consists of four 18-foot McDougal roasting furnaces, three 55″ x 240″ water jacketed blast furnaces, smelting furnaces, one 17′ x 92′ reverberatory furnace, water plant, sampling mills, three boilers using oil for fuel, generators, offices, etc. Electric power obtained from Northern California Power Company. Daily capacity of smelter 1000 tons; production in 1908 was 3,061 tons. Smelter idle since 1911. Number of men employed at present sixty-five—fifteen in mine and fifty on surface. Total operating cost in 1908 was $5.58 per ton. One of the large copper mines of Shasta County, with over 2,000,000 tons of ore in sight. Hall desulphurizing plant being installed.

Bibl.: Bull. No. 50, pp. 88–94; Reports X, p. 638; XII, p. 245; XIII, p. 61.

Bald Eagle, consisting of 140 acres, in Sec. 10, T. 34 N., R. 3 W., 2 miles north of De La Mar, in the Pittsburg mining district. Claims are in the Shasta Forest Reserve. Owner, J. Gilardy. Ore similar to the Bully Hill. Only small amount of development work done and extent of ore body not determined. Idle at present.

Brushy Canyon, consisting of 160 acres in Sec. 34, T. 34 N., R. 3 W., about 2 miles southeast of Copper City, in the Pittsburgh mining district. Owners, W. Collins et al. A tunnel is in over 300 feet through a black, slaty-shale formation, distorted and sheared by intrusions. Ledge outcrops on the surface. Idle.

Bibl.: Bull. No. 50, p. 102.

Bully Hill, one of the famous copper mines of California, is located in Secs. 15, 16, 21, 22 and 28, T. 34 N., R. 3 W., M. D. M., in the Pittsburgh mining district, near the town of De La Mar, and in the Shasta Forest Reserve. The holdings comprise 450 acres, of which 320 are patented, and include the old Winthrop and Baxter, Bully Hill, Rising Sun and Rising Star groups, all well toward the eastern end of the copper belt. General Electric Company, of Syracuse, New York, owners. Geo. Hanley, superintendent. The Sacramento and Eastern standard gauge railroad, owned by this company, connects the mine with Pit station on the Oregon branch of the Southern Pacific Railroad. This road is about 14 miles long, and handles all necessary freight. The Bully Hill mine lies in meta-rhyolite. The ore is found in veins trending northeast and southwest with almost a vertical dip to the east, width from 4′ to 400′, averaging about 30′. The eastern wall is formed by basalt, and the vein occupies a shear zone. Two main parallel lodes have been exploited. The ore occurs in irregular lenticular bodies, connected by narrow seams of ore, attaining an average width of 45 feet, and a length of 200 feet. In the basalt wall are found ore deposits fully equal to those occurring in the vein. The ore is of a complex and refractory nature, carrying zinc, antimony, copper, gold and silver. Copper oxides are found in the upper levels, changing into copper glance (chalcocite) with depth, and chalcopyrite in the lowest levels.

The mine has been opened by a number of tunnels with extensive drifts, crosscuts, raises, comprising several thousand feet. There are nine levels 100 feet apart, eight raises from 50 to 560 feet in height, and 1100-foot crosscut on the Bully Hill claim. The lowest tunnel (No. 3 level) was run as a crosscut and struck the vein at a distance of 1100 feet, and about 600 feet below the gossan outcrop. At this point a station (100 feet square) was established, extensive hoisting and pumping machinery installed, and a 3-compartment shaft sunk to a depth of 950 feet. No. 3 level is connected by chutes and raises with the upper workings, of which some drifts run along the vein 800 and 1000 feet. This level is connected by railway with the smelter 1 mile distant and the ore handled through it. The mine is timbered by the square set system, the timbers being floated down the Pit River from the timber region to the northeast.

The mine equipment consists of cars, tools, a 2-drum electric hoist, two electrical pumps, shops, compressor plant, and all necessary dwellings.

The smelting plant, daily capacity 400 tons, was installed in 1901, at a cost of $200,000, and consists of one water-jacket furnace (42″ x 120″), two calcining furnaces, five converters for bessemerizing the matte, shops, etc. Idle during 1913. The product of the converters is blister copper about 98% fine, and is shipped to the refinery built by Capt. De La Mar on Kill von Kull, near New York City. As the ore carries considerable zinc, laboratory tests are being made to find a proper method of treatment. During 1913 sixteen men were employed. This mine has the greatest depth below the surface of any copper property in California, and has produced several millions. It was worked as a silver mine in the '60s by H. McDonnell, as the ore on the surface carried high values in this metal. Acquired later by James Sallee, and purchased by Captain De La Mar in 1899 and sold in 1903 to present owners.

Bibl.: Bull. No. 50, pp. 78–84; Report XIII, pp. 61, 62.

Chance, in Sec. 21, T. 34 N., R. 3 W., consists of 80 acres, patented, in the Pittsburgh mining district, about 1 mile north of Copper City. Owner, R. G. Dunn. Ore body, consisting of heavy grayish sulphides, is similar to the Bully Hill. Extent of shoot not determined, as only small amount of development work has been done. Short tunnels. Bully Hill group of claims to the east. Prospect. Idle.

Congress, consists of 120 acres in Sec. 4, T. 33 N., R. 2 W., in the North Cow Creek district, about 2 miles west of Ingot. Owner, H. A. Cook, of Ingot. A series of exploration tunnels aggregating 500 feet have been run, but no great depth below the croppings have been reached. Owner does assessment work only. Prospect

Bibl.: Bull. No. 50, p. 111.

Copley listed under gold.

Crystal Group, consisting of twenty-three claims, is located in Sec. 11, T. 33 N., R. 6 W., in the Flat Creek mining district, adjoining the Balaklala on the north and the Vulcan on the west, and about 3½ miles northwest of Coram. Owners, Crystal Copper Company, W. S. Tyler, president; J. L. McGinnis, secretary. Short tunnels. Idle. Prospect.

Bibl.: Bull. No. 50, p. 113.

De Dallis, consists of 175 acres in Sec. 34, T. 34 N., R. 3 W., in the Pittsburgh mining district, about 1½ miles southeast of Copper City, in the Shasta Reserve. Owners, Ellis et al. Slate foot and quartz-porphyry hanging-walls. Ore body said to be 200 feet long and 8 feet wide. Several hundred feet of development work consisting of 420-foot tunnel and drifts. Three men employed. Prospect.

Bibl.: Bull. No. 50, p. 102.

Donkey, consists of 40 acres, patented, in Sec. 11, T. 33 N., R. 2 W., in the North Cow Creek mining district, about 2 miles northeast of Ingot, and in the Shasta Forest Reserve. Owner, A. J. McKendrick, of Ingot. It is an old property located in 1876 by A. J. Cook, and said to be an extension of the Afterthought lead. The ore occurs in rhyolite, and is a heavy grayish sulphide, carrying a high percentage of zinc, in addition to copper, gold and silver. Development work consists of a 200-foot shaft, 300 feet of drifts, and a 100-foot raise. Equipment consists of electrical hoist, 1500-gallon electrical pump, and dwellings. Western Zinc Company of San Francisco worked the property on a lease for a time and shipped 300 tons of ore to their plant at South San Francisco. Ore very difficult to treat on account of zinc. Property has been a producer. Idle.

Bibl.: Bull. No. 50, pp. 105, 106.

Friday & Lowden, consists of thirteen claims, in Secs. 5 and 6, T. 33 N., R. 5 W., about 3 miles west of Kennett, in the Backbone mining district. Owner, J. R. Lowden et al., of Redding. This group of claims is the first encountered on the copper belt on the north side of Squaw Creek, and is directly east of the gold belt in which the Uncle Sam mine is located. Elevation about 2000 feet. The geological conditions are similar to those found in adjacent territory on the copper belt. Oxide ore carries considerable gold, and the property was worked at one time for this metal. Workings consist of about 1000 feet of tunnels. Idle.

Bibl.: Bull. No. 50, pp. 94, 95.

Giant Consolidated, consists of thirteen claims, in Secs. 19 and 24, T. 33 N., R. 5 and 6 W., about 3 miles northwest of Copley, in the Flat Creek mining district. Owners, W. H. Soderberg et al., of San Francisco. Claims are located on the eastern edge of this part of the copper belt, north of the Jumping Jack. Only slightly developed by a 310-foot tunnel, and some open cuts. Prospect. Idle.

Bibl.: Bull. No. 50, p. 85.

Gold Belt, consists of six claims, in Sec. 4, T. 33 N., R. 2 W., about 2 miles west of Ingot, in the North Cow Creek mining district, and in the Shasta Forest Reserve. Owners, Jones & Tucker, of Ingot. A 50-foot shaft penetrated 6 feet of iron capping, below which a schistose and slaty formation was encountered, carrying copper sulphurets with traces of gold, silver and zinc. Prospect. Idle.

Bibl.: Bull. No. 50, p. 111.

Golinsky Group, formerly known as Little Backbone, under bond to J. Bayhau, is located in Sec. 28, T. 34 N., R. 5 W., about 4 miles west of Kennett, in the Backbone mining district. Owner, B. Golinsky, of Kennett. Holdings consist of 300 acres, patented, adjoining the Mammoth mine on the east. Ore body and formation similar to the Mammoth. Workings consist of several tunnels, one being 800 feet in length, 400 feet of drifts, and one stope. Ore bin and dwellings on the property. Produced $70,000. Five men employed. Some good ore in sight.

Bibl.: Bull. No. 50, p. 111.

Great Verde, formerly known as the Vulcan, is located in Secs. 11 and 12, T. 33 N., R. 6 W., about 7½ miles west of Kennett, in the Flat Creek mining district. Holdings consist of twelve claims (four patented), owned by the Vulcan Mining Company of San Francisco. W. K. Lisle, superintendent. Several tunnels. Some low grade ore in sight. A little prospecting done with a diamond drill. Adjoins the Balaklala on the north. Idle at present. Prospect.

Bibl.: Bull. No. 50, p. 98.

Hartford consists of ten claims, 3 miles north of the mouth of Protem Creek. Owners, Hartford Consolidated Mining Company, W. Gerry, president. Limited amount of sulphide ore. Only developed to a limited extent by 500 feet of tunnels. Lode on the surface 8 feet wide, and can be traced about 100 feet. Surface ores consist of oxides and carbonates of copper. Prospect. Idle.

Bibl.: Bull. No. 50, p. 108.

Indiana and Last Chance consists of four claims, in Sec. 29, T. 33 N., R. 5 W., about ½ mile north of Copley, in the Flat Creek mining district. Owners, Roan & Putney. Workings comprise several hundred feet of tunnels and drifts. Heavy sulphide ore, with some high grade oxides on the surface. Small producer. Two men employed.

Ingersoll, formerly known as the Peerless, is located in Secs. 25 and 36, T. 33 N., R. 6 W., in the Flat Creek mining district, about 2 miles west of Copley. Holdings consist of 300 acres, adjoining the Trinity Copper Company's property. Heavy gossan outcrop similar to the Trinity Copper, on same lead. Workings consist of a 350-foot tunnel on the lode, and a 190-foot crosscut. Idle.

Bibl.: Bull. No. 50, p. 114.

Jumping Jack consists of five claims in Secs. 24 and 25, T. 33 N., R. 6 W., in the Flat Creek mining district, about 3 miles west of Copley. Owner, W. Candrick. Claims on same belt as the Iron Mountain. Only slightly developed by a tunnel 400 feet long; extent of ore body not determined. Prospect. One man working.

Bibl.: Bull. No. 50, p. 85.

Kosh Creek, consists of twelve claims, in Sec. 23, T. 37 N., R. 1 W., several miles north of the copper belt. Owners, W. Murray et al. Ore is a dark basaltic rock, carrying native copper, which occurs in globules and films in the vesicles of the rock. Ore zone said to be 200 feet wide. Slightly developed. Idle. Prospect.

Bibl.: Bull. No. 50, p. 108; Report XIII, p. 63.

Loraine, located in Secs. 7 and 8, T. 33 N., R. 5 W., adjoins the Spread Eagle group on the northeast, and about 4 miles west of Coram Station. Owner, D. Endicott et al. One tunnel 425 feet long on the ore body and several short crosscuts. Idle.

Bibl.: Bull. No. 50, p. 87.

Mammoth Copper Mine, the largest copper producer in California, is located in Secs. 2, 3, 29, 31, 32, and 33, T. 33 and 34 N., R. 5 W., about 4 miles northwest of Kennett. The holdings, consisting of 2500 acres patented, and several claims held by location, are owned by the United States Mining and Smelting Company, but this mine is operated as the Mammoth Copper Mining Company. President, W. G. Sharp; secretary, F. W. Bachelder; general manager, F. W. Metcalf; superintendent of mine, R. E. Hanley; superintendent of smelter, J. H. Kerbin. Home office, Boston, Mass. Elevation at main workings 3000 feet. Formation and character of ore similar to other mines on the western portion of this copper belt. Some of the ore bodies are 800 feet long and 90 feet wide, and are opened up by numerous tunnels, drifts, stopes, etc., aggregating over 60,000 feet of development. The lowest tunnel, the Coleman level, is over 2200 feet long, and serves for hauling the ore from all parts of the workings to the surface, where it is dumped into bins, and then conveyed to the smelter, a distance of four miles, by means of electric cars. In working the mine the top-slicing method is used. After removing the ore from a certain area the empty stope is filled by caving down the roof. The effect of this method is seen on top of the mountain above the workings, where the ground has caved in many places and is crossed by numerous fissures.

The greatest depth on the ore bodies is 700 feet. There is a large tonnage of low grade ore blocked out. The mine equipment consists of all mechanical devices necessary to operate on a large scale, such as compressors, sawmill, shops, railways, both electric and steam (at smelter), ore bins, dwellings, etc. Nelson, the discoverer of this mine, worked it in a small way for gold, as the gossan carries gold values similar to the Iron Mountain. The smelter at Kennett has a capacity of 2200 tons (see photo No. 6). A bag house has been installed to gather the fumes. The semi-pyritic process of smelting is used, the ore being treated with a low percentage of coke. The matte is treated and refined at Chrome, New Jersey. Smelter is not running at full capacity, as only 1200 tons are being handled at present. About 825 men are employed. Operating cost is very low. The smelting process consists in eliminating the excess of iron in the ore by adding an excess of silica and lime to the charge, so as to obtain a thin slag. It requires one car of coke to three of ore and silica, which are automatically conveyed from the weighing platform to the blast furnaces (five in number) by means of electrical trains. The matte from the furnaces is taken to the converters by means of a 50-ton crane. The converters, made by Allis-Chalmers Company, are 96″ x 150″ and are acid lined. When the five converters are running the first matte is reconcentrated in the blast furnace up to 40%. Matte as low as 18% has been treated.

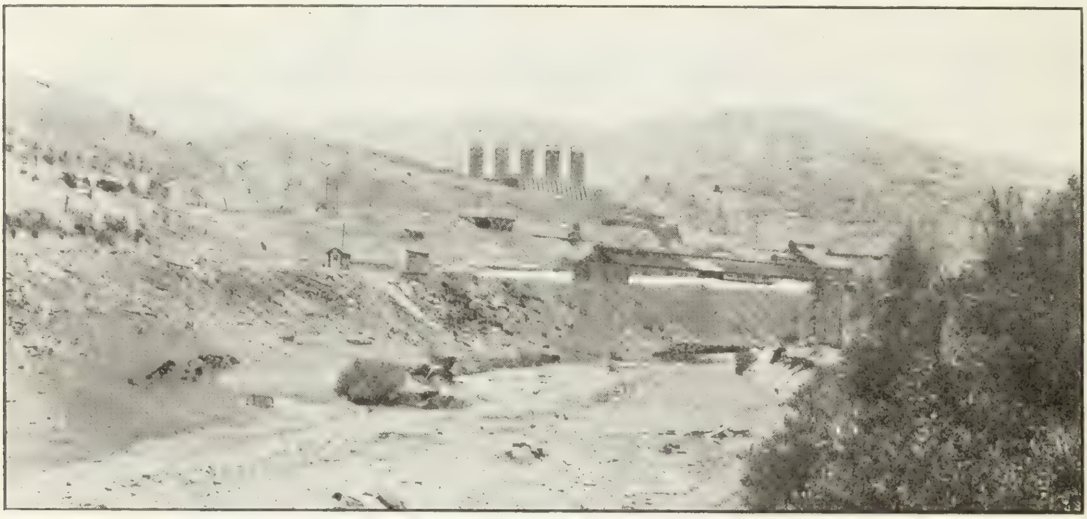


Photo No. 6. Mammoth Smelter; bag house in center.

The bag house, contained in a building 210′ long, 63′ wide and 66′ high, was built in 1910 to remove the arsenic, sulphur and other impurities from the fumes. This house is divided into five sections or towers, each section containing 592 bags, or a total of 2960. The bags, made of woolen, are 34 feet long and 18 inches in diameter, and are set longitudinally. The residue, collected in the bags from the fumes, is in the form of a white powder (arsenic, sulphur, gold), and when shaken from the bags drops into a water hopper and is then removed. As no process has as yet been devised for treating this residue, it is stored near the smelter. Some 16 tons obtained daily at the present time. Upon leaving the blast furnaces, these fumes pass through a steel pipe 10 feet in diameter, thence into brick flues, then into four steel pipes, each 8 feet in diameter, thence into a fan discharge chamber from which they enter steel pipes 4 feet in diameter, arranged in nine sets of five each, and then into the distributing chamber of the bag house.

Bibl.: Bull. No. 50, pp. 95, 97.

Marshall & Walters, consists of 160 acres in Secs. 14 and 15, T. 33 N., R. 6 W., in the Flat Creek mining district, about 4 miles west of Coram Station. Owners, Marshall & Walters, of Redding. Slightly developed by a tunnel 400 feet long. Prospect adjoining the Stowell on the south. Idle.

McClure, consisting of 160 acres, patented, is located in Secs. 9 and 16, T. 34 N., R. 3 W., 1½ miles north of Copper City, in the Pittsburgh mining district, and adjoins the Bully Hill on the northeast. Owners, Mt. Shasta Gold Mines Corporation. Formation and ore body similar to its famous neighbor. The principal development work consists of a crosscut tunnel over 500 feet long, in which some good ore is exposed. Prospect. Two men employed.

Bibl.: Bull. No. 50, p. 110.

Mineral Mountain consists of six claims, on the southwest terminus of the copper belt, in Sec. 13, T. 32 N., R. 6 W., in the Flat Creek mining district, and 3 miles south of Iron Mountain. Owners, D. T. Callahan et al. Three hundred-foot tunnel shows sulphide ore. Surface indications of other ore bodies. Prospect. Idle.

Bibl.: Bull. No. 50, p. 84.

Morris, consists of 120 acres, in Sec. 10, T. 34 N., R. 3 W., in the Pittsburgh mining district, about 2½ miles north of De La Mar, and in the Shasta Forest Reserve. Owner, W. H. Barkhurst, of Redding. Ore similar to Bully Hill. Two tunnels, 400 feet and 80 feet in length. Prospect. One man working.

The Mountain Copper, formerly known as Iron Mountain, is the pioneer copper mine of the Shasta County copper belt. The holdings, consisting of several hundred acres, patented, are located in Secs. 34 and 35, T. 33 N., R. 6 W., M. D. M., 11 miles by railroad northwest of Keswick. Owners, Mountain Copper Company of London, England. F. B. Lawson, chairman of board of directors; A. N. Frewer, secretary; W. F. Kett, general manager; W. L. Cole, superintendent. This company controls a large acreage on Iron Mountain, between Slick Rock and Boulder creeks. Elevation varies from 2400 to 3200 feet. The mine is opened up by thousands of feet of tunnels driven from points high up the sides of the hill, and the ore has been stoped from a large portion of the ore body on the south side. Country rock is rhyolite and quartzite.

Deposit consists of massive lenses, with "gossan" (reddish oxide capping) on the surface, and below the capping a heavy grayish sulphide, carrying copper, gold and silver. Equipment consists of 11 miles of narrow gauge steam road which hauls the ore from the mine to the railroad (Southern Pacific Railway Company), cars, shops, 75 h.p. electric hoist, pumps, dwellings, etc. Power obtained from Northern California Power Company. The old smelter at Keswick has been dismantled and the ore is now shipped to the company's 350-ton smelter near Martinez. The company owns a large area of timber land on the Pit River, 65 miles from Keswick, and the timber is floated down the Pit and Sacramento rivers to this place. There is a large tonnage of ore blocked out in the mine; 350 men employed at present. Splendid success has been made in locating ore by means of the diamond drill. This property was worked in the eighties as a gold and silver mine, and was acquired in 1895 by London capital and the Mountain Mines Syndicate, Ltd., was formed, and in 1897 was transferred to the present Mountain Copper Company, composed practically of the same individual interests. The company has paid several millions in dividends. (For fuller details see Bull. No. 50, pp. 70–78.)

Mountain Monarch consists of 120 acres, in Secs. 28 and 32, T. 32 N., R. 6 W., 2 miles south of Stella, in the Shasta mining district. Owners, Mountain Monarch Mining Company, of Redding. W. P. Aron, president. Ore occurs in meta-andesite, and is 5 feet wide on the surface, principally malachite. A crosscut has been run for a length of over 700 feet, and some ore exposed, but main ore body has not been reached. Idle.

Ohio consists of 120 acres, patented, in Sec. 12, T. 33 N., R. 6 W., 5 miles west of Coram, in the Flat Creek mining district. Owners, Bliss Estate, of New York. Heavy sulphide ore, similar to the Iron Mountain. Several tunnels have been run, longest 530 feet. Idle.

Oregon Consolidated, in Secs. 13, 14 and 23, T. 33 N., R. 6 W., about 6 miles west of Copley. Owners, Scamman et al. Holdings consist of six claims. Development work consists of several tunnels comprising about 1500 feet in all. Some sulphide ore exposed, but the extent of the ore body not determined. Under bond at one time to the Baker Consolidated Copper Company of Detroit, Mich. Idle. Prospect.

Bibl.: Bull. No. 50, p. 113.

Pit River, consisting of 140 acres, is located in Sec. 25, T. 34 N., R. 3 W., about 3½ miles northeast of Copper City, in the Pittsburgh mining district and in the Shasta Forest Reserve. Owner, E. Popejoy. Ore and formation similar to Bully Hill. Some of the oxide ore on the surface carries good gold values. One tunnel 500′ long. A little ore shipped to smelter. One miner employed.

Polkingham consists of five claims in Sec. 11, T. 33 N., R. 2 W., 1 mile south of Ingot, in the North Cow Creek mining district and in the Shasta Forest Reserve. Owners, Polkingham Mining Company, of Ingot. R. Polkingham, president. A shaft 100 feet deep has been sunk on the croppings. Little ore in sight, some gold values in oxidized zone. Idle.

Bibl.: Bull. No. 50, p. 111.

Popejoy, in Sec. 25, T. 34 N., R. 3 W., 3 miles northeast of Copper City, in the Pittsburgh mining district and in the Shasta Forest Reserve. Owner, W. Randall. The holdings, consisting of 100 acres, adjoin the Pit River claims. Base ore similar to Bully Hill, extent of ore body not determined as development work confined to several short tunnels. Prospect. Idle.

Roseman consists of nine claims and a smelter site, in Secs. 3 and 34, T. 33 and 34 N., R. 4 W., about 6 miles east of Kennett. Owner, H. Roseman et al., of Redding. Ore occurs in or near a lime deposit, the footwall apparently being in serpentine. The formation has nothing in common with either the West Side district or the Bully Hill. Workings mainly along the outcrop, consisting of short tunnels. Idle.

Bibl.: Bull. No. 50, p. 109.

Shasta King constitutes the principal mining holding of the Trinity Copper Company, a Boston corporation; T. W. Lawson, president. The property consists of eighty-four patented claims, 580 acres on Squaw Creek and 800 acres of placer, mineral and timber lands, in Secs. 11, 12, 23, 24, 25 and 26, T. 33 N., R. 6 W., 7 miles west of Kennett. The Shasta King workings face the Balaklala, but are several hundred feet below it. The property was acquired in 1900 and development work pursued on an extensive scale for some years. The ore body has been opened up by tunnel levels, cutting it on the main level for over a distance of 1000 feet around the mountain side, and these have been connected by drifts along the footwall. The large ore body of a massive sulphide character, similar to the Balaklala, outcrops on the mountain side, forming one half of Squaw Creek canyon, course of which at the mine is east and west. The gossan croppings are very prominent and can be followed several thousand feet. A large tonnage of ore said to be blocked out. A double track incline 850′ long handles the ore from the mine to the Balaklala aerial tram. The equipment consists of large ore bins at the mine and at Coram, shops, dwellings, and a large office building in Kennett. No mining work being pursued at present. Three men employed as watchmen.

Bibl.: Bull. No. 50, p. 87.

Shasta May Blossom, formerly known as the Keith, consisting of twenty-two claims, is located in Sec. 14, T. 34 N., R. 3 W., ½ mile north of De La Mar, in the Pittsburgh mining district. Owners, Shasta May Blossom Copper Company, of Fruitvale; M. Lindley, president. Vein matter is a spar-schist footwall and granitic-porphyry hanging. A body of gossan croppings 30 feet wide is found near the top of the hill. Development work consists of 7 tunnels, aggregating 2000 feet, and several open cuts. Prospect. Two men employed.

Bibl.: Bull. No. 50, p. 100.

Spread Eagle, consisting of twenty-seven claims, in Sec. 13, T. 33 N., R. 6 W., 4 miles west of Coram, in the Flat Creek mining district, have been recently purchased by the Mammoth Mining Company. Former owner, W. G. Onn, of Copley. Development work consists of eight tunnels, aggregating about 3000 feet. Some good ore in sight.

Bibl.: Bull. No. 50, p. 85.

Stevenson consists of 140 acres, in Sec. 14, T. 33 N., R. 6 W., 3½ miles west of Coram, in the Flat Creek mining district. Owner, C. Butler. Only slightly developed by means of short tunnels and open cuts. On the main copper belt. Gossan croppings well defined.

Stowell, formerly known as the Grab, and also as the Webster Consolidated, is one of the old locations on the West Side copper belt. It consists of three claims in Sec. 14, T. 33 N., R. 6 W., 4 miles west of Coram, in the Flat Creek mining district. Owners, Stowell Estate, of Redding. Workings consist of short crosscut tunnels, aggregating about 800 feet of development work, but none has reached the objective point. One man working.

Bibl.: Bull. No. 50, p. 85.

Sugar Loaf, formerly known as the Galvin, consists of 340 acres, in Secs. 25 and 26, T. 33 N., R. 6 W., immediately northeast of the Mountain Copper Company's holdings, on Sugar Loaf Mountain, the first prominent outcrop on the copper belt after leaving the Iron Mountain mines. The formation is the same as that encountered elsewhere on the belt. Croppings of gossan, 400 feet wide in places, indicate the presence of ore bodies in the rhyolitic rocks. It is owned by the Copper Mountain Consolidated Mining Company, of Redding; J. Pilluis, president; F. Grotefend, secretary. The development work consists of twelve tunnels, aggregating over 4000 feet. No definite ore body exposed as yet. Equipment consists of air compressor, shop and dwellings. Electric power obtained from Northern California Power Company. Three men employed.

Bibl.: Bull. No. 50, p. 84.

Sulphide consists of four claims, in Sec. 16, T. 32 N., R. 6 W., ½ mile from Stella, in the Shasta mining district. Owner, J. F. Conkling. A shallow exploration tunnel run along a contact shows up low grade sulphides carrying a little gold. Prospect. Idle.

Summit Group, owned by the Stauffer Chemical Company of San Francisco, is located in Sec. 30, T. 34 N., R. 5 W., 4 miles northwest of Kennett, in the Backbone mining district. Chas. Kunze, of Kennett, superintendent. This property is situated on the eastern slope of Bohematosh Mountain, and adjoins the Mammoth Company's holdings on the west. The country rock is heavily mineralized, and the ore body is the same in character as the more southerly part of the copper belt. Extent of ore body not determined, but is over 30 feet wide in places. The workings consist of three tunnels, one 400 feet long, and a 350-foot raise. A 4-drill Sullivan compressor, shop and dwellings constitute the surface equipment. Five men employed.

Bibl.: Bull. No. 50, p. 97.

GOLD.

The gold production record of Shasta County from 1880 is derived principally from two sources—the smelting of base ores, and the milling of quartz (siliceous ores).

The closing down of all but one of the smelters has caused a material decrease in the amount of gold produced, and several of the quartz mines supplying ore to these plants have stopped operations also. Adjacent to different parts of the copper belt are gold quartz districts, in which are many veins carrying low, medium, or high grade ores, which are base, as a rule, and can not be efficiently and profitably reduced by milling processes. They occur notably in the vicinity of the old town of Shasta, 4 miles south of Iron Mountain, and are distributed for several miles south and east of this end of the belt, especially through the Shasta, Flat Creek and Old Diggings districts. In fact, gold quartz veins are abundant in close proximity to the copper belt generally, and the smelters have created a market for these ores and enabled the development of a number of quartz properties.

In 1912 the quartz mines produced $702,267 in gold and $4,200 in silver, while the copper smelters yielded $220,775 gold and $420,894 silver.

French Gulch, 21 miles northwest of Redding, the most active quartz mining district in Shasta County, produced $380,305 in gold in 1912, or over 50% of the gold yield from siliceous ores. The Gladstone, one of the famous quartz mines in this county, is the largest producer in this district, next in order being the Milkmaid and Franklin, Brunswick, El Dorado and Eureka, Halcyon, Summit, and Washington.

The *Midas,* another famous quartz mine, is the only gold producer in the Harrison Gulch district.

There are also a few small quartz producers near Stella, Buckeye, Igo, Kennett, Keswick and Ono.

Placer mining is very limited, the dredging operations near Redding affording the largest output. A small production is reported from the placers at French Gulch, Bayles (Delta), and Lamoine.

HISTORY.

Reading, of Trinity fame, gave his name to the district which sprang up in 1849 around Clear Creek and lifted Shasta City to prosperity. In this district, centering around Shasta, were a number of camps along and near Clear Creek, the most famous being Horsetown, which passed out of existence years ago. The bed of the creek proved rich and by the autumn of 1850 several dams were placed to turn the current. This stream is now being worked by means of a dredge.

The main Sacramento River toward Soda Springs, acquired fame chiefly in 1850 when Dog Creek and other tributaries lured the prospector. Dredging operations are being pursued at the present time on the Sacramento River, just above Redding.

Placer gold was discovered in the region of Bully Hill as early as 1853, which became known as the Pittsburgh district. With this discovery began a stampede which resulted in the location of a large number of placer claims, many of which were of little value, and active interest lapsed before 1870.

In 1862 gold was discovered in the surface rock near Copper City, and when the ore was found to contain silver as well as gold, there was another rush into this district and a search begun for the supposed rich veins of gold and silver. Bully Hill was located at this time.

Eight quartz mills, comprising a total of 60 stamps, had been erected in this county prior to the year 1896, three mills (40 stamps), being in operation in French Gulch at that time.

The *Washington Mine,* near French Gulch, discovered in 1852, is said to be the first quartz location in Shasta County, and in 1869 had the largest mill, consisting of 22 stamps. This property is still worked in a limited way and a small production obtained. All the old workings are caved.

In 1877 a mill was erected at Copper City to work ore from the Bully Hill, and during a period of three years over $640,000 was produced, the surface ore only being worked.

The principal gold quartz deposits are fissure veins, generally narrow, having steep dips, and occurring either in slate or in meta-andesite, and associated as a rule with porphyry dikes. The usual trend of the fissure is east and west, though minor variations are found occasionally.

GEOLOGY OF DISTRICTS.

The deposits in the French Gulch district lie within the area of slate and conglomerate, generally associated with intrusive granite porphyry dikes. The workings in the Gladstone mine clearly demonstrate the persistency of the ore bodies with depth.

A good wagon road connects French Gulch with Redding, the county seat and freight terminal for this district. The haul is about 21 miles over an easy grade.

The line of the Northern California Power Company passes through the district, so that cheap electrical power is at hand.

The topography of the county is such as to afford good tunnel sites. Mining operations can be pursued throughout the entire year. The cost of mining is reasonable.

Bibl.: Report X, p. 635; U. S. Geol. Surv., Bull. No. 540, pp. 31, 55, 56.

In the vicinity of *Stella,* 11 miles northwest of Redding, the fissure veins cut the quartz diorite and alaskite porphyry, and the pay ore is apparently found along the edge of the latter. This district is said to rank next to French Gulch in total gold output. At the present time none of the properties are being worked on an extensive scale, hence the output is small.

Bibl.: U. S. Geol. Surv., Bul. No. 540, p. 47.

In the *Dog Creek District* the deposits are all within the areas of meta-andesite, cut by dikes of feldspathic dacite porphyry and occasionally alaskite. The pay ores exposed in the development work consist of irregular shoots, but the extent of these bodies has not been determined as yet. Delta, the nearest railroad point, is on the edge of this district, and a narrow gauge railroad extends from this station westerly for a distance of 7 miles. A number of promising quartz properties have been developed to a limited extent in this district, and the numerous ledges of pay ore should lead to considerable production in the near future.

Bibl.: U. S. Geol. Surv., Bull. No. 540, p. 71.

The gold zone extends from the base ore belt, southwesterly, to the extreme boundary of Shasta County, including Igo, Ono and Harrison Gulch districts.

The *Igo District* is 13 miles southwest of Redding, and some good placer ground has been worked in this section. The débris law has stopped hydraulic operations. The quartz mining has been carried on to a limited extent. The pay shoots are short but carry good values in gold. Good wagon road from Redding to the town of Igo. The same general conditions apply to Ono, some 7 miles west of Igo.

The *Harrison Gulch District,* 50 miles southwesterly from Redding near the Trinity County line, is known principally on account of the Midas mine. Here the ore occurs in slate, near a porphyry dike, and considerable evidence of faulting is found. The pay shoot has an average width of 12 inches. The haul is rather expensive, as two mountain ranges must be crossed.

The *Squaw Creek District,* extending westerly from Kennett, contains both base and free milling ores. The Uncle Sam gold mine is in this district. Rich pockets are often found along the contact of slate and meta-andesite and many prospectors have made a stake by ''pocket hunting.'' The direct cause of several of the failures in lode mining is due to the installation of mills more elaborate than the size of the ore body justified.

Bibl.: Report X, p. 639

AURIFEROUS GRAVEL.

An immense deposit of auriferous gravel, commencing southwesterly from the city of Redding, in Sec. 36, T. 31 N., R. 6 W., near the old site of Horsetown and trending east to the foothills of the Lassen Buttes and down the Sacramento Valley, has been extensively worked in the past.

Oregon Gulch, about 10 miles in length, was exceedingly rich and was worked from its source to the valley. It empties into the Sacramento River 1½ miles south of Redding.

Onley Creek, another rich stream, heads in the Muletown Mountains, runs in a southeasterly course and empties into the Sacramento River about 1 mile south of Oregon Gulch.

An old river bed, having a general northeast and southwest course, and crossing the Sacramento River one mile north of Redding at right angles has been traced from the northeast to the western boundary of the State. It passes through the old site of Horsetown, thence westerly and southeast of Igo; here it turns to the southwest and passes through the old town of Ono, and can then be traced from here to Watson's Gulch, and thence into Arbuckle. This channel can be distinctly observed on the top of Arbuckle Mountain, 3000 feet above sea level; from which point it takes a short bend and runs in a westerly direction to Knob Gulch and can be traced up this gulch for over 10 miles. The placers of Knob Gulch were very rich where the channel crossed it. Upon approaching the Chauchalua Mountains all traces of the river bed disappear and are not again visible until Hay Fork, in Trinity County, is reached. From that point it takes its regular course, passes through Humboldt County and empties into the Pacific Ocean at Gold Bluff.

Hazel Creek, some 15 miles long, was worked in early days throughout its entire length, the gravel being very rich. This stream, after flowing southwesterly through country rock of slate and granite, empties into the Sacramento River in Sec. 18, T. 37 N., R. 4 W., near Sims Station.

DREDGING.

There are several thousand acres of dredging ground along Clear Creek and the Sacramento River. Some of the land adjacent to the town of Igo is being drilled to determine dredging possibilities. Only two dredges are in operation in Shasta County at the present time, one on Clear Creek a few miles below Redding, and the other on the Sacramento River just above that city. The ground along Clear Creek, on which dredging is being pursued, averages 20 feet in depth, the gravel being loose river wash, carrying few large boulders and only a little clay. The contour of the ground is fairly even and the timber growth is scattered. The gold is generally fairly coarse and worth about $19 per ounce. Conditions for economical working are very favorable.

Suction dredges have been operated along the Sacramento River, above Redding, and also along Clear Creek, but with poor success.

William Desilhorst successfully operated a steam scoop along Clear Creek for several years, but the best ground has evidently been worked out as the plant has been idle for some time.

Bibl.: Bull. No. 57, pp. 213–218.

GOLD MINES—QUARTZ AND PLACER.

Accident, formerly known as the *Sybel,* consists of 80 acres, patented, in Sec. 7, T. 33 N., R. 7 W., about 5 miles northwest of French Gulch, in the French Gulch mining district. Owners, Accident Gold Mining Company; home office, Redding; G. E. Garwood, president. Elevation at mine workings 3700 feet. Three veins on claims. Slate foot and diorite-porphyry hanging-walls. Strike N. 80° W., dip 50° N. Ore shoot 100 feet long and 3 feet wide, free milling. Workings consist of a tunnel 2200 feet long, 400 feet of drifts, and a 100-foot stope. Reduction equipment consists of a 4-foot Huntington mill, operated by steam power. Property said to have been a producer. Idle. Prospect.

Bibl.: U. S. Geol. Surv., Bull. No. 540, pp. 68–69.

Advance Consolidated, consisting of 135 acres (20 acres patented), is located in Sec. 2, T. 35 N., R. 6 W., 7 miles west of Delta, and ½ mile from the Delta Consolidated Railroad, in the Dog Creek mining district. Owners, Advance Consolidated Mining Company of San Francisco. Three parallel veins on this group 4 feet wide. Andesite footwall and diorite hanging, strike east and west, dip vertical. Pay shoot 400 feet long and 4 feet wide, free milling. Workings consist of four tunnels on the vein from 50 to 1100 feet long, and 1000 feet of drifts, stopes and raises. Reduction plant consists of old rolls (six in number), crusher, 50-ton cyanide plant (failure). Small producer. Considerable money expended on plant and in experimenting with the ore. Delta Consolidated to the east, and Trinity Consolidated to the south. One man working.

Alice, consists of 120 acres, in Sec. 19, T. 32 N., R. 5 W., 1 mile southwest of Keswick, in the Shasta mining district. Owner, F. Bonte. Three parallel veins 3 feet wide, strike N. 60° E., dip S. 75° E., granitic-porphyry walls. Pay shoot 80 feet long and 3 feet wide, free milling. Best ore has a width of 8 inches. One tunnel 600 feet long on the veins, short stope and 200-foot drift. Reduction equipment consists of an old 4-stamp mill (850-pound stamps). Idle. Small producer at one time. Three men doing some prospecting work.

Bibl.: Reports XII, p. 245; XIII, p. 349.

Al Toland, consists of 60 acres, in the Shasta Forest Reserve, in Sec. 28, T. 36 N., R. 6 W., 7½ miles west of Delta and 1½ miles west of Delta Consolidated Railroad, in the Dog Creek mining district, Owner, A. L. Toland. Elevation 3700 feet. One vein on claims, width 2½ feet, strike NW. and SE., dip 45° SW., pay shoot 110 feet long and 2½ feet wide, free milling. Workings consist of several short tunnels. Main tunnel 200 feet long and 180-foot winze at face of same; short drift and stope. Old 2-stamp mill, steam driven. Idle. Small producer, some high grade. Two men employed.

American Mine, formerly known as the *French Gulch,* adjoins the Gladstone on the west, the workings consisting of tunnels at several elevations between 2500 and 3150 feet on the north ridge of Cline Gulch. This group is located in Secs. 12 and 13, T. 33 N., R. 7 W., 3½ miles northeast of French Gulch, in the French Gulch mining district. The holdings consist of 60 acres, patented, and 40 acres held by location. Owners are W. Franck et al., of French Gulch. The country rock consists of slate and conglomerate. Fissure vein has a strike of N. 63°–80° W., and a dip of S. 75° E.; slate walls. Pay shoot 125 feet long and 2 feet wide, free milling. Length driven on vein 1400 feet in tunnel, greatest depth 650 feet; four tunnels from 50 to 1400 feet in length; one stope 125 feet long and 240 feet in height; 80-foot winze and 300-foot raise. Mining and filling method used. Some of the old workings caved. Mine equipment consists of ¼ mile single track tram (mine to mill), cars, shop and dwellings. The old 10-stamp mill, steam driven, is idle. Two men employed doing prospect work. Property said to have produced $300,000. Rich ore worked from the surface. Located in 1886, and sold to a San Francisco company which became involved in financial difficulties, and finally acquired by the present owners, the creditors. Not worked on any scale since 1908.

Bibl.: Reports, VIII, pp. 564–565; X, p. 637; XII, p. 245; XIII, p. 349; U. S. Geol. Surv., Bull. No. 540, pp. 35, 60–61.

Atlantic, consists of 100 acres, in Secs. 17 and 20, T. 31 N., R. 6 W., 3 miles northwest of the town of Igo, in the Igo mining district. Owner, W. L. Kingsbury. Two parallel veins about 150 feet apart have been worked in a small way. Pay shoot 70′ long and 15″ wide, in granite. One tunnel on vein for a distance of 440 feet. A little ore shipped to Selby smelter gave returns of $80 per ton in gold. Small producer. Two men employed.

Australia, consists of 80 acres, in Secs. 19 and 30, T. 32 N., R. 6 W., 3 miles north of the old town of Shasta in the Shasta mining district. Owner, M. Garrecht. Elevation at main tunnel 1300 feet. Three veins, two parallel, on the claims; only parallel veins have been worked. Strike east and west, dip 60° N., meta-andesite footwall and granitic porphyry hanging. Pay shoot 60 feet long and 4 feet wide. Workings consist of three tunnels on the veins, longest tunnel 340 feet with a 40-foot winze at the face. Old 3-stamp mill, driven by water power from Brandy Creek (ditch 1 mile long), is idle. Stamps weigh 850 pounds each. Small producer. Two men employed.

Bibl.: Report XIII, p. 362.

Black Bear, consists of 80 acres, in Sec. 9, T. 29 N., R. 10 W., 1 mile south of Harrison Gulch, in the Harrison Gulch mining district. Owners, W. D. Lilly et al., of Redding. One vein 5′ wide in slate, only slightly developed. Two short tunnels.

Black Hawk, consists of 80 acres in Sec. 14, T. 31 N., R. 6 W., about 1 mile northwest of Centerville, in the Igo (formerly South Fork) mining district. Owner, W. Dunham. One vein, meta-andesite walls, only small amount of development work by a tunnel 400′ long. Little ore taken out. Idle. Prospect.

Black Spider, consists of 80 acres, in Sec. 19, T. 32 N., R. 5 W., about 1½ miles southwest of Keswick. Owner, R. Bell. Workings consist of old shaft 460 feet deep, a 420-foot tunnel, and short drifts. Ore shoot 160 feet long and 6 feet wide, free milling, but low grade. Little ore extracted. Idle. Alice prospect to the east.

Bibl.: Reports XII, p. 246; XIII, p. 350.

Bodie, in Secs. 6 and 32, T. 32 and 33 N., R. 7 W., about 3 miles southwest of French Gulch, in the French Gulch mining district, consists of 40 acres, at an elevation of 3800 feet. Owner, F. B. Rossi.

Vein occurs between a granodiorite footwall and a granitic-porphyry hanging. Pay shoot 250 feet long and 2 feet wide, free milling. Workings consist of a tunnel 560 feet long on the vein, 400 feet of drifts, stope 110 feet in length and a 40-foot shaft (caved). Old 5-stamp mill has been removed from the property. Small producer at one time. Idle.

Bonanza, in Sec. 6, T. 32 N., R. 6 W., 4 miles northwest of Stella (old Whiskeytown), consists of 60 acres, at an elevation of 1600 feet. Owner, M. C. Dewey et al., of Stella. Three veins, two parallel about 300 feet apart, and one cutting these at an angle of 40°. The vein that has been worked has a north and south strike, and dips 50° southeast, slate footwall and granitic-porphyry hanging. This vein is cut by a diorite dike 20 feet wide, with an east and west strike. Pay shoot is 120 feet long and 14 inches wide. Workings consist of three tunnels about 50 feet apart—lower 180 feet long, middle 120 feet, and upper 60 feet long. Bright Star to west. Idle.

Bright Star, formerly known as the *Iron Mask,* consisting of 120 acres, is located in Sec. 31, T. 32 N., R. 6 W., about 4½ miles northwest of Stella, in the Shasta mining district. Owner, S. W. Levy, of San Francisco. Elevation 2400 feet. The vein has a north and south strike, and a dip of 60° E., slate footwall and granitic-porphyry hanging. Pay shoot said to be 200 feet long and 16 inches wide. Workings consist of two tunnels. Main tunnel on vein is 900 feet long and crosscut 180 feet in length, also 450 feet of drifts and a stope 200 feet long. Old 5-stamp mill idle, driven by water; ditch 2 miles long, from Whiskey Creek. Property has been a producer but idle at present. Bonanza to the west.

Bibl.: Report XII, p. 250; U. S. Geol. Surv., Bull. No. 540, p. 55.

Brunswick, consists of 100 acres, in Sec. 20, T. 33 N., R. 7 W., 5 miles west of French Gulch, in the French Gulch mining district. Elevation 3200 feet. Owners, Brunswick Mining Company. Two parallel veins. Strike east and west, dip 60° N., quartz-porphyry footwall and slate hanging. Pay shoot said to be 250 feet long and 6 feet wide, free milling. About 6 inches of good ore on hanging-wall side. Five tunnels run on the vein, from 100 to 800 feet in length, 700 feet of drifts, a stope 200 feet long and several open cuts, constitute the development work. Old 5-stamp mill idle. Said to have produced $100,000. Idle.

Bibl.: Report XIII, p. 351; U. S. G. S., Bull. No. 540, pp. 35, 37, 68.

Bulwer and *Virginia,* in Sec. 18, T. 33 N., R. 7 W., 5 miles northwest of French Gulch, in the French Gulch mining district, consists of 40 acres. Elevation 2400 feet. Owners, J. Reinhaus et al., of French

Gulch. Three parallel veins on the claims, strike north and south, dip 65° E., granitic-porphyry footwall and slate hanging. Ore shoot 200 feet long and 2 feet wide, free milling, 700-foot tunnel on the vein. Little ore extracted. Idle.

Bunker Hill consists of 60 acres, patented, in Sec. 29, T. 32 N., R. 5 W., 3 miles east of Shasta, in the Shasta mining district. Owners, Pryor and Logan. Elevation 1000 feet. One vein 5 feet wide, strike north and south, dip 40° E., granitic-porphyry walls. Workings consist of a tunnel 460 feet long and 200 feet of drifts. Idle.

Calumet Consolidated, consisting of 80 acres of patented mineral land, is located in Sec. 20, T. 32 N., R. 5 W., about 1 mile south of Keswick. Owners, Dr. Garlick et al., of San Francisco. Elevation at tunnel 750 feet. Only one of the several veins on the claims has been worked. Strike is east and west, dip 15° N., diorite walls. Pay shoot over 200 feet long, with an average width of 20 inches. Ore is free milling near the surface, but tends to become base with depth (copper sulphides). Maximum depth on vein about 250 feet. The workings consist of a tunnel on the vein 1100 feet long, several hundred feet of drifts, raises and stopes. The reduction equipment consists of a 40-stamp mill (old), steam driven, four Frue vanners, and an old 10-ton chlorination plant. Mine was a producer at one time, but has not been worked in recent years. Inez to north.

Bibl.: Reports, VIII, p. 563; X, p. 631; XI, pp. 43, 395.

Carnegie Group, Ltd., formerly known as the *Clipper* and *Snider,* is located in Sec. 1, T. 33 N., R. 6 W., 7½ miles west of Kennett, in the Flat Creek mining district. The group, consisting of 120 acres, patented, is owned by A. Di Nola et al., of San Francisco. Elevation 2300 feet. The vein has an east and west strike and dips 45° N., average width 2½ inches; granitic-porphyry walls. Pay shoot 200 feet long and 2½ feet wide, free milling. The workings consist of a shaft 230 feet deep, with three levels at 50′, 150′ and 200′, drifts, 50-foot raise, and a stope 130 feet long, as well as a 460-foot tunnel, all on the vein. The reduction equipment consists of a 10-stamp mill, steam driven, two Frue vanners and blanket table. Idle. Property has been a producer but idle at present. Some ore in sight. Mentioned in our eleventh, twelfth and thirteenth reports.

Central, consists of 80 acres, patented, in Sec. 33, T. 33 N., R. 5 W., 2½ miles east of Copley, in the Flat Creek mining district. Owner, A. A. Anthony, of Whitehouse. Elevation 1500 feet. Two parallel veins about 150 feet apart on the claims, strike north and south, dip 40° E., quartz-porphyry walls. Pay shoot 230 feet long and 6 feet wide, free milling near the surface but base with depth (copper sulphides). Workings consist of a tunnel on the vein, 1340 feet long, 900 feet of drifts and one stope. Old 6-foot Huntington mill, steam driven, Some production from the oxidized ore near the surface. Idle.

Bibl.: Reports, VIII, pp. 565-566; X, p. 631; XII, p. 246; XIII, p. 351.

Chapman and *Voluntine* (drift and hydraulic) mine, consists of 100 acres, patented, in Sec. 25, T. 36 N., R. 6 W., ¾ of a mile south of Centerville. Owner, C. A. Chapman of Redding. Course of channel, northeast and southwest, soft granite bedrock. Pay gravel about 20 feet deep. Worked as a drift mine for some years, and then as a hydraulic proposition. Water obtained from Happy Valley ditch. Good producer until operations were stopped some twelve years ago on account of the debris law. Some good ground yet to be worked. Princess placer to the southwest.

Clara, consisting of 60 acres, patented, is located in Sec. 17, T. 32, N., R. 5 W., ½ mile west of Keswick. Owner, O. La Platte. Elevation 1000 feet. Three parallel veins, granitic-porphyry walls. Pay shoot 160 feet long and 20 inches wide, free milling. Tunnel on main vein 700 feet long. A little high grade extracted. Prospect. Idle.

Cleveland, consists of 60 acres, patented, in Sec. 15, T. 32 N., R. 5 W., 4 miles west of Redding, in the Shasta mining district. Owner, D. H. Hunt, of Redding. Elevation 800 feet. Vein is 15 inches wide between diorite walls, strike northwest, dip S. 60° W. Pay shoot said to be 200 feet long and 15 inches wide. Ore is base, carrying gold with sulphides of copper, lead and iron. Worked for gold. Some rich ore shipped to smelter. Only slightly developed by 200-foot tunnel, drift and stope. Idle.

Climax, consists of 60 acres, in Secs. 16 and 21, T. 31 N., R. 6 W., about 3 miles northwest of Igo. Owner, S. W. Robinson. One vein in granite. Ore shoot short, free near surface but base with depth. Only limited amount of development work by means of short tunnels. Old Justin mill dismantled. Has been a small producer. Worked a few months each year. Prospect.

Colorado, in Secs. 16 and 17, T. 33 N., R. 7 W., 3 miles northwest of French Gulch, in the French Gulch mining district, consists of 80 acres. Elevation 1600 feet. Owner, T. McDonald of French Gulch. Vein is 10 inches wide, strike northeast and southwest, dip 40° N., granite-porphyry footwall and slate hanging. Ore shoot 160 feet long, free milling, 400-foot tunnel on the vein. Idle.

Compton, consists of 40 acres, in Sec. 20, T. 32 N., R. 5 W., 1¼ miles south of Keswick, in the Shasta mining district. Owner, G. F. Bassett. Elevation 900 feet. One vein in granitic-porphyry. Short pay shoot. Slightly developed by short tunnel and drift. One man working.

Consolidated Gold Dredging Company, operating along the Sacramento River, own 260 acres, in Secs. 20 and 28, T. 32 N., R. 5 W., about 1½ miles northeast of Redding. W. F. McClure is president of the company, and W. D. Egilbert, superintendent of dredge. Course of channel is north and south, slate bedrock, hard and tilted. Depth of pay gravel from 8 to 20 feet. Dredge equipped with 5-foot buckets and handles about 50,000 cubic yards of gravel per month. Power is obtained from Northern California Power Company. Twelve men employed.

Consolidated Kascinaska, formerly known as *Quartz Hill,* in Sec. 10, T. 32 N., R. 5 W., 4 miles southwest of Redding. Owners, Kascinaska Mining Company, Chicago, Illinois. Holdings consist of 80 acres, patented, at an elevation of 950 feet. Two parallel veins strike N. 40° W., dip 50° W., slate footwall and quartz-porphyry hanging, width of vein 8 inches. Pay shoot 140 feet long and 4 feet wide, free milling, low grade. Workings consist of several tunnels from 50 to 480 feet long, drifts and stopes. Idle for several years. Mentioned in our Twelfth and Thirteenth Reports.

Copley, consists of 60 acres, in Sec. 32, T. 33 N., R. 5 W., near the town of Copley, in the Flat Creek mining district. Owner, J. R. King. Elevation 860 feet. Worked the oxidized ore on the surface for the free gold, but with depth the ore became base, still carrying best values in gold. One vein, strike northeast and southwest, dip 60° NE., width 4 feet. Length of pay shoot not determined. Workings consist of 310-foot tunnel, 60-foot drift and stope 60 feet long. Owner doing assessment work.

Bibl.: Report XIII, p. 352.

Corrine, consists of 160 acres, in Sec. 32, T. 32 N., R. 5 W., 1 mile west of Redding, in the Shasta mining district. Owners, E. P. and J. C. Connor of Redding. Elevation 800 feet. Two parallel veins, strike northeast and southwest, dip vertical. Pay shoot 200 feet long and 15 inches wide, free milling, carrying rich sulphurets. Workings consist of four tunnels from 60 to 430 feet long, and old 110-foot shaft, 600 feet of drifts and a stope 160 feet long. Reduction equipment consists of 5-stamp mill (750-pound stamps), and one Wilfley table. Idle. Property was a producer at one time. Two men at work.

Cortez, consisting of 65 acres, is located in Sec. 10, T. 33 N., R. 2 W., ½ mile northwest of Ingot, in the North Cow Creek mining district. Owner, A. J. Cook, of Ingot. Elevation, 1400 feet. Two parallel veins about 40 feet apart. Length of pay shoot not determined. Vein on contact between rhyolite and shale. Three short tunnels on veins. Afterthought copper mine to northeast. One man working.

Bibl.: Reports, XII, p. 70; XIII, p. 352.

Crystal, consists of 60 acres, in Sec. 17, T. 31 N., R. 6 W., 3 miles northwest of Igo, in the Igo mining district. Owners, Kingsbury & Hubbard. Three parallel veins in granite. Ore is a grayish gold-silver sulphide. Pay shoot short and values are not uniform. Only slightly developed with short tunnels. A little ore shipped to smelter gave returns of $50 per ton in gold and silver. Worked a few months during the year. Prospect.

Delta Consolidated, the largest quartz property in the Dog Creek mining district, is located in Secs. 1, 3, 6, and 31, T. 35 and 36 N., R. 5 W., 6½ miles west of Delta. The holdings consist of 650 acres (80 acres patented timber land) in the Shasta Forest Reserve. Owners are the Delta Consolidated Mining Company of Redding. S. T. White, president; S. D. Furber, secretary. Elevation varies from 2800 to 3000 feet. The mine is connected with Delta, a station on the Oregon branch of the Southern Pacific Railroad, by means of a narrow guage railroad, 6½ miles long, constructed by the company. There are 10 veins on the claims. The principal lodes, known as the Pioneer, Rickard, Scorpion, Black Oak and Caledonia, have a strike of N. 70° E., and a vertical dip, and can be traced on the surface for several thousand feet. The walls are andesite. Pay shoot is said to be 800 feet long and 18 inches wide, free milling. Maximum depth on ore body is 300 feet. Workings consist of several tunnels on the veins, from 20 to 1600 feet in length, drifts, nine raises from 100 to 200 feet high, and a stope 200 feet long. Mine equipment consists of cars, one Climax geared engine, tools, shop and dwellings. The reduction equipment consists of three separate mills, with a total of 10 stamps, operated by water power obtained from Dog Creek. Ore reserve estimated at 20,000 tons. Cost about $4.25 per ton to work. Ample timber at hand. Three men employed at present, but force to be increased shortly. Rich ore worked years ago in an arrastra. Advance Consolidated to the west, and Trinity Consolidated to the south.

Bibl.: Report XIII, p. 353.

Diamond, formerly known as *Black Prince,* consists of 80 acres, in Sec. 18, T. 31 N., R 6 W., 4 miles northwest of Igo, in the Igo mining district. Owner, S. W. Robinson. Four veins on the group, but only one, the Black Prince, has been worked. Granite footwall and meta-andesite hanging. Pay shoot 100 feet long and 2 feet wide, ore base below the surface. A tunnel 400 feet long, short drifts, and one stope on the vein. Ore shipped to smelter gave returns of $50 per ton in gold and silver. Prospect being worked by Roberts & Wheeler of Igo, under a lease.

Bibl.: Report XIII, p. 355.

Edna B., in Sec. 6, T. 31 N., R. 5 W., 1½ miles east of Shasta, in the Shasta mining district, consists of 100 acres, owned by J. H. Beecher of Anderson. Elevation 1300 feet. One vein 3 feet wide, quartz-porphyry walls, strike northeast and southwest, dip 45° E. Pay shoot 200 feet long and 3 feet wide, free milling. Workings consist of a tunnel 500 feet long on the vein and 400 feet of drifts. Small producer at one time. Idle.

Bibl.: Reports XII, p. 247; XIII, p. 355.

El Dorado and Eureka, consisting of 40 acres, is located in Sec. 3, T. 32 N., R. 7 W., 3½ miles south of French Gulch, in the French Gulch mining district. Elevation 3000 feet. Owner, J. C. Connor, of Redding. Two parallel veins on claims, slate footwall and quartz-porphyry hanging; strike is northwest and southeast, dip 45° SE. Pay shoot 240 feet long and 3 feet wide, free milling. Workings consist of a tunnel 580 feet long on the vein and 300 feet of drifts. Small producer. Two men employed.

Bibl.: Reports XII, p. 247; XIII, p. 355; U. S. Geol. Surv. Bull. No. 540, pp. 56, 57.

Empire, consists of 60 acres, patented, in Sec. 18, T. 33 N., R. 7 W., 5 miles northwest of French Gulch in the French Gulch mining district. Elevation 3000 feet. Owners, J. E. Franck et al., of French Gulch. Property formerly owned by the Empire Mining Company of Salt Lake City, Utah. One vein has been worked. Strike east and west, dip 15° N. granitic-porphyry footwall and slate hanging. Ore shoot 100 feet long and 6 feet wide. Workings consist of four tunnels from 115 to 500 feet long, 300 feet of drifts and one stope 100 feet long. Old 5-stamp mill, steam driven. Idle. A small producer several years ago. One man working.

Bibl.: Report XIII, p. 356.

Empire, consists of 120 acres, in Sec. 9, T. 30 N., R. 7 W., 3 miles southwest of town of Ono, in the Ono mining district. Owners, McCormick and Murray Estate, of Redding. Two parallel veins exposed on the surface, with slate walls. Pay shoot about 80 feet long and 1 foot wide, ore free milling. Only slightly developed by a tunnel 500 feet long. Little ore shipped to smelter. Idle.

Esperanza, consists of 160 acres, in Sec. 29, T. 29 N., R. 10 W., about 1½ miles east of Harrison Gulch, in the Harrison Gulch mining district. Owner, A. J. Oswald. Four veins exposed on the surface, three being parallel. A shaft has been sunk on the Lucky George claim to a depth of 214 feet, and three crosscuts run, longest 141 feet, working through a fault. A little ore on the surface. A 12 h.p. steam hoist used. Four men employed. Prospect.

Eureka Tellurium, consisting of 290 acres, near Middle Creek, is located in Sec. 32, T. 32 N., R. 5 W., 3 miles southwest of Redding. Owners, Eureka Tellurium Company, J. E. Jarvis, president. Elevation 700 feet. Ten veins on the group, but only one has been worked. Strike N. 25° E., dip 60° E., width 3 feet; walls are slate. Pay shoot 130 feet long and 3 feet wide, free milling on surface, but base with depth. Ore said to contain tellurides. Several tunnels on the vein, main tunnel is 520 feet long. A furnace 5 feet by 20 feet, with 8-foot agitators, 16 barrels, 3 feet by 4 feet, hollow and egg-shaped, and a 4-foot steam filter, with a small precipitating vat, constituted the reduction equipment. Small production from property some years ago. Idle.

Bibl.: Reports, XI, p. 43; XII, p. 248; XIII, p. 356.

Evening Star, consists of 60 acres, patented, in Sec. 4, T. 32 N., R. 5 W., 2 miles southeast of Copley, in the Flat Creek mining district. Owners, Estate of F. Litsch. Three parallel veins, strike N. 50° W., dip 50° S., greenstone footwall and granitic-porphyry hanging. Pay shoot 230 feet long and 14 inches wide, free milling. Development work consists of a tunnel 1100 feet long and 1000 feet of drifts. Three men employed.

Florence, consists of 60 acres, in Sec. 18 T. 30 N., R. 7 W., about 8 miles southwest of Ono. Owner, A. E. Baker. One vein 10 feet wide, has been slightly developed, strike N. 30° W., dip 40° E., slate walls. Ore is low grade and base, carrying some copper, lead and zinc, besides gold. Idle.

Franklin, consists of 40 acres, in Sec. 10, T. 33 N., R. 2 W., 1 mile southwest of Ingot, in the North Cow Creek mining district. Owner, J. A. Cook, of Oakland. Short ore shoot in which some high grade is found. Worked by lessees at times. Only slightly developed by short tunnels.

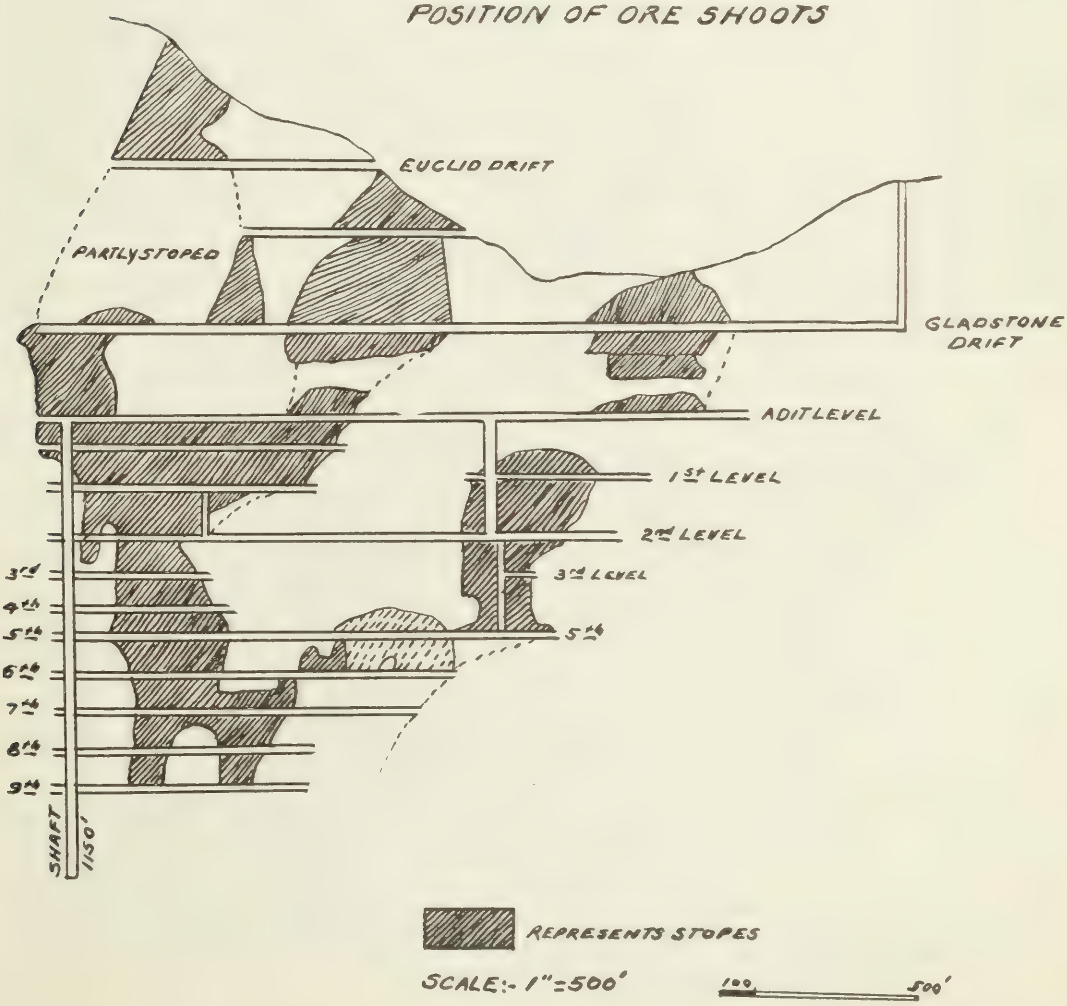
Gambrinus Mine, discovered in 1870, is located in Sec. 16, T. 32 N., R. 6 W., in the town of Stella (Whiskeytown). This well known property is owned by the Shasta Monarch Mining Company, of Redding. T. W. Rogers, superintendent. The holdings consist of 80 acres. Elevation about 1200 feet. There are four parallel veins on the group, three being only 60 feet apart, strike is N. 50° W., dip 45° N., meta-andesite footwall and quartz porphyry hanging. The pay shoot is 220 feet long and 18 inches wide, free milling ore. The workings consist of several tunnels, the main tunnel being 410 feet long on the vein, stopes and drifts, also a crosscut 110 feet long. The mine equipment consists of cars, tools, shop and dwellings. A new 10-stamp mill with two concentrators constitute the reduction equipment, operated by steam power. Property has been a producer for many years and was worked in the early days by gophering along the rich surface streaks. The tailings are dumped into Whiskey Creek. Ten men employed.

Bibl.: U. S. Geol. Surv., Bull. No. 540, pp. 38, 39, 50, 51.

Garfield, consisting of 80 acres, is located in Sec. 34, T. 33 N., R. 5 W., 2 miles east of Copley, in the Flat Creek mining district. Elevation, 1200 feet. Owner, George Barr. One vein, strike N. 50° E., dip 40° E., quartz-porphyry walls. Ore shoot 90 feet long and 2 feet wide, free milling. One tunnel 570 feet long and 230-foot drift. Small producer. Two men employed. Sam Houston to the north.

Gladstone, the largest quartz producer in Shasta County, is located in Secs. 1, 7, 8, 12 and 18, T. 33 N., R. 6 and 7 W., M. D. M., about 4½ miles northeast of the town of French Gulch, in the French Gulch mining district. The holdings consist of 178 acres, patented, and 485 acres held by location, at an elevation of 2300 feet. It was acquired in 1901 by the present owners, Hazel Gold Mining Company, J. O. Jillson, presi-

SECTION ALONG GLADSTONE VEIN
SHOWING
POSITION OF ORE SHOOTS



dent and manager; E. L. Young, superintendent. The upper 1000 feet of the vein has been mined by means of tunnels, while the lower portion is worked from a blind shaft on the main adit level, and is developed by three levels (see map). The exhausted stopes and upper workings are filled with waste obtained in crosscutting. The country rock consists of slate, conglomerate and sandstone. There are two fissure veins that have been worked, strike east and west, dip vertical, width 3 feet; both walls are slate. The ore shoot is 300 feet long and 3 feet wide, free milling ore. Length driven on vein 2500 feet. Greatest depth 2100 feet. Workings consist of eleven levels below the main adit, the lowest being 1150 feet below the adit; all drifts to the east, No. 3 being the shortest, having a length of 600 feet; raises made from one level to another for air; shaft 1150 feet deep from adit tunnel; several stopes, one being 300 feet long, 4 feet wide and 1100 feet high. Mine equipment consists of new hoisting plant (375 h.p., 2-reel drums), compressor plant, electric cars, shops and dwellings. Electric trains, consisting of ten cars (2200 pounds to a car), haul the ore from the mine to the mill. There are also 9 miles of power and 5 miles of telephone lines on the property. Reduction equipment consists of 30-stamp mill (electrically driven), nine concentrating tables and electroplating plant. All machinery operated with electric power from Northern California Power Company. Stamps weigh 1050 pounds and drop at the rate of 106 times per minute from a height of 6 inches. Mill crushes 100 tons in twenty-four hours, through a 40-mesh screen; 92% extraction is obtained. Tailings dumped into Clear Creek. Company employs 140 men, 40 on top, 90 in mine and 10 in mill. Property produced $3,000,000 since 1901. Original owners of this mine took out $80,000 in high grade. New hoist over shaft will have a steel gallows frame. About 70 gallons of water per minute is pumped with electrical pumps. American mine to the east.

Bibl.: Reports, VIII, pp. 568–569; X, p. 637; XI, p. 45; XII, p. 248; XIII, p. 357; U. S. Geol. Surv., Bull. No. 540, pp. 35, 37, 46, 57–60.

Golden Crown, consists of 80 acres, in Sec. 19, T. 31 N., R. 6 W., 2 miles northwest of Igo, in the Igo (South Fork) mining district. Owners, Dunham & Gilson. One vein 1 foot wide, syenite footwall and granitic-porphyry hanging. Short ore shoot, free milling. Prospect, only slightly developed. Little ore shipped to smelter. Idle.

Great Falls and Hope, consists of 100 acres, in Secs. 7 and 18, T. 31 N., R. 6 W., 4½ miles northwest of Igo, in the Igo (South Fork) mining district. Owner, Mrs. M. Ballou. Elevation 2100 feet. Four veins, three parallel, syenite footwall and granite hanging. Ore shoot 80 feet long and 2 feet wide, free milling. Workings consist of a tunnel on vein 520 feet long, short drifts and a stope. Little ore shipped. One man employed.

Gray Eagle, consists of 100 acres, in Sec. 10, T. 29 N., R. 10 W., 1 mile south of Harrison Gulch, in the Harrison Gulch mining district. Elevation 3000 feet. Owner, A. E. Johnson. One vein 12 inches wide, slate footwall and diabase hanging. Short ore shoot. Prospect.

Halcyon consists of 40 acres, in Sec. 17, T. 33 N., R. 7 W., 4 miles northeast of French Gulch in the French Gulch mining district. Elevation 2000 feet. Owner, C. L. Watson of French Gulch. Vein has a northeast and southwest strike and dips N. 80° W., slate footwall and tuff hanging. Ore shoot 80 feet long and 1 foot wide, free milling. Developed by means of a tunnel 400 feet long, 500 feet of drifts and 130-foot shaft. A little ore milled. One man working. Prospect.

Hardscrabble Mine (drift and hydraulic), formerly known as the *Piety Hill,* is located in Secs. 27, 34 and 35, T. 31 N., R. 6 W., ½ mile south of Igo, and consists of 1700 acres, patented. Owners, Happy Valley Land and Water Company, of Olinda. A. E. Bowles president. This company owns the old Dry Creek Tunnel and Flume Company's ditch, now known as Happy Valley ditch, which diverts water from the North Fork of Cottonwood, Eagle, Andrews and South Fork of Clear creeks. Course of channel is north and south, slate, sandstone and granite bedrock. Workings consist of old 1500-foot tunnel and several shafts 50 feet deep. Some of gravel 50 feet deep, average 20 feet. About 120 acres have been worked. Operated in the sixties by Alvinza Hayward as a drift and hydraulic mine. Has been a famous producer. Idle for several years. Water supplied to consumers through the old ditch.

Bibl.: Reports, XII, p. 249; XIII, p. 359.

Highland Mine, consisting of 60 acres, is located in Sec. 14, T. 33 N., R. 7 W., 2 miles northeast of French Gulch in the French Gulch mining district. Elevation 2800 feet. Owner, Highland Mining and Tunnel Company, of French Gulch; G. R. Simmons, superintendent. Strike of vein is north and south, dip 20° E., slate footwall and quartz-porphyry hanging. Pay shoot 250 feet long and 3 feet wide, free milling ore. Greatest depth on vein 400 feet in tunnel. Development work consists of several tunnels, 400 feet of incline shaft, drifts and stopes. Main tunnel is 1800 feet long on vein. Old 5-stamp mill is driven by water power; a ditch 3 miles long takes the water out of Clear Creek. Property said to have produced $100,000. Four men employed.

Bibl.: U. S. Geol. Surv., Bull. No. 540, p. 69.

Hope, in Sec. 8, T. 32 N., R. 7 W., 5 miles southwest of French Gulch, in the French Gulch mining district, consists of 60 acres. Elevation 1200 feet. Owners, M. Welch et al., of French Gulch. Ore shoot 100 feet long and 1 foot wide, free milling, slate walls. Workings consist of tunnel 480 feet long, 400 feet of drifts, one stope 80 feet long and 140-foot incline shaft. Rich ore on the surface was worked in arrastra. Idle.

Inez, consists of 120 acres, in Secs. 19 and 20, T. 32 N., R. 5 W., about ¾ of a mile south of Keswick. Owner, W. T. Lee. Ore shoot short. Ore free on the surface but base with depth. Workings consist of a 300-foot tunnel, 100-foot drift and several open cuts.

J. I. C., in Sec. 13, T. 33 N., R. 7 W., 3 miles northeast of French Gulch in the French Gulch mining district, consists of 40 acres. Elevation 2500 feet. Owner, V. Fox, of French Gulch. Strike of vein is northeast and southwest, dip N. 68° W., width 2 feet. Pay ore is found in pockets between slate walls. Workings consist of a tunnel 1000 feet long, 300 feet of drifts and 220 feet of incline shaft. Some rich ore found. Idle.

Bibl.: Reports, XII, p. 250; XIII, p. 360.

Jubilee, consists of 40 acres, in Sec. 23, T. 31 N., R. 6 W., ½ mile from Centerville. Owner, O. Westbrook, of Larkin. Five veins on claims, slate footwall and granitic-porphyry hanging. Pay shoot 100 feet long and 4 feet wide, free milling ore. Only slightly developed. One man working.

Kit Carson, consists of 100 acres, patented, in Sec. 3, T. 32 N., R. 5 W., 2½ miles southeast of Copley, in the Flat Creek mining district. Elevation 950 feet. Owners, Joshua Hendy Estate. Four parallel veins 3 feet wide, strike northeast and southwest, dip 50° E., granitic-porphyry footwall and slate hanging. Pay shoot 200 feet long and 3 feet wide, low grade. Workings consist of a 700-foot tunnel and 300 feet of drifts. Idle.

Laconia, in Sec. 1, T. 35 N., R. 6 W., 7 miles west of Delta and 1 mile east of Dog Creek Railroad, in the Dog Creek mining district, consists of 20 acres, in the Shasta Forest Reserve. Elevation 2000 feet. Three parallel veins, strike east and west, dip 40° S., meta-andesite footwall and quartz-porphyry hanging. Pay shoot 80 feet long and 3 feet wide. Short tunnels. Idle.

Liberty, consists of 240 acres, patented, in Secs. 31 and 36, T. 33 N., R. 5 and 6 W., 1½ miles northwest of Copley, in the Flat Creek mining district. Elevation 2000 feet. Owners, J. Chambers et al., of Redding. Three veins 2 feet wide, strike east and west, dip 65° N., quartz-porphyry walls. Pay shoot 220 feet long and 2 feet wide. Base ore.

Workings consist of a tunnel 1850 feet long, a 250-foot shaft and short drifts. Small producer at one time. One man employed.

Lodi, consists of 60 acres, in Sec. 16, T. 31 N., R. 6 W., about 3¼ miles north of Igo. Owners, W. D. Bull et al. Elevation 1400 feet. One vein 2 feet wide. Short ore shoot. Ore base below the surface, consisting of gold, silver, zinc and galena. Slightly developed with a short tunnel. Little ore shipped. Idle.

Bibl.: Reports, XII, p. 252; XIII, p. 361.

Lost Channel (drift) mine, consisting of 580 acres, is located in Secs. 3, 4 and 34, T. 30 and 31 N., R. 6 W., and extends southerly from the town of Igo for a distance of 1½ miles. Owner, C. A. Russell of Igo. The bedrock is soft, decomposed granite, slightly tilted. Course of channel is north and south, and contains some pay to a depth of 20 feet below the surface. Best values found 4 feet above bedrock. Workings consist of several tunnels, longest 1800 feet; also a number of old shafts 50 feet deep, all along Dry Creek. About 5 acres have been worked. Some of the gravel is rich. Gold is 875 fine, and sells for $18 per ounce. Leased by Porter & Thompson of Seattle, Wash., who endeavored to work the ground as a ''dry land'' proposition, using a shovel and then dumping the gravel into a rotary grinder, then running the tailings over a short copper plate. Experiment a failure. Power obtained from Northern California Power Company. Holdings now being drilled to determine dredging possibilities. Six men employed. Property has been a producer since 1865, when the first location (the Blue Bird) was made by T. White. Piety Hill drift mine to the northeast.

Mad Mule, formerly known as the *Banghart,* is located in Sec. 32, T. 33 N., R. 6 W., 5 miles northwest of Stella (by road), in the Shasta mining district. Holdings consist of 60 acres, located in 1887 and owned by the Mad Mule Mining Company of San Francisco; T. W. Briggs, superintendent. Two parallel veins exposed. Strike east and west, dip 30° N., slate footwall and meta-andesite hanging. Pay shoot 80 feet long and 16 inches wide. Four tunnels run on the veins, from 200 to 1000 feet in length. A tunnel is being run to obtain more depth on the ore body, four men being employed. Depth at present is about 250 feet. Surface sluiced off years ago and was rich. Best ore found near the footwall.

Bibl.: Reports IX, p. 38; XI, p. 396; XII, p. 252; XIII, p. 361; U. S. Geol. Surv., Bull. No. 540, pp. 40, 42, 52-54.

Mad Ox, consists of 80 acres in Sec. 32, T. 33 N., R. 6 W., 5 miles northwest of Stella. Owners, Caribou Gold Mining Company of Trinity Center. Elevation at tunnel 1800 feet. The vein has a strike of N. 30° E., dip S. 80° E., andesite forms both walls. Pay shoot 100 feet long and 14 inches wide, free milling. Worked to a depth of 150 feet. Four short tunnels and one shaft on the vein. Worked but little since 1911.

Bibl.: Reports, XI, p. 397; XII, p. 252; XIII, p. 361; U. S. Geol. Surv., Bull No. 540, p. 51.

Maduro, consists of 60 acres, in Sec. 20, T. 32 N., R. 5 W., 1 mile south of Keswick. Owner, W. Shattuck. Elevation 800 feet. Four parallel veins, but little developed. Only enough work done to hold the claims. Prospect. Idle.

McCall, consisting of 60 acres in the Shasta Forest Reserve, is located in Sec. 32, T. 36 N., R. 5 W., 7 miles southwest of Delta, in the Dog Creek mining district. Elevation 1600 feet. Owners, A. J. Kirk et al. One vein 3 feet wide, strike N. 50° W., vertical dip, granodiorite footwall and slate hanging. Pay shoot 80′ long and 27 inches wide, free milling. Four tunnels, about 60 feet apart, from 50 to 1200 feet long, and 400 feet of drifts constitute the development work. Little high grade shipped.

McKinnon, consists of 60 acres, in Sec. 6, T. 35 N., R. 5 W., 7½ miles west of Delta, and 1½ miles east of Dog Creek Railroad in the Dog Creek mining district, and in the Shasta Forest Reserve. Owner, A. McKinnon. One vein exposed, strike east and west, dip 70° N., 2 feet wide, granodiorite walls. Pay shoot 160 feet long and 2 feet wide, free milling. Three tunnels on the vein from 60′ to 750′ in length. Two men employed.

Midas, quartz mine, consisting of 550 acres, is one of the famous gold producers of Shasta County. It is located in Secs. 3, 4, and 10, T. 29 N., R. 10 W., some 52 miles southwest of Redding, by road, and in the Harrison Gulch mining district. The Victor Power and Mining Company has recently acquired this property. President, J. H. Sharp; secretary, P. H. Coffman; superintendent, A. L. Fletcher. Home office, Red Bluff. There are three known veins on the group—Gold Hill, Baldwin and Middle—strike N. 48° W., dip 75° S., average width 14 inches. There is considerable faulting, largest fault over 400 feet in width. The ore occurs in lenticular form, the pay shoots varying in length from 200 to 400 feet, width 14 inches, free milling. The Baldwin vein has been extensively worked. The development work consists of two double compartment shafts (6′ x 12′), one being 1400 feet deep, 14 levels, 26,000 feet of drifts, 11,000 feet of crosscuts, raises, stopes from 50′ to 300′ long, and tunnels from 50′ to 900′ in length. Stripping and filling method of mining used. Timber obtained from company's holdings and worked in sawmill some three miles from the mine. The mine equipment consists of two steam hoists and all necessary equipment such as cars, shops, tools and dwellings. Steam power used for hoisting throughout the year, while mill, pumps and compressor run on steam for seven months, balance of year by water power. The reduction equipment consists of a 20-stamp mill, 1000-pound stamps, six Frue concentrators and a new 100-ton cyanide plant, fine grinding with tube mill. Several thousand tons of tailings have been impounded ready for treatment. Company also owns 1200 acres of timber land. Number of men employed—top 25, mine 98, mill 4, total 127. Production for 1912—tons, daily 53, monthly 1597, for year 19,166. Percentage of extraction 76.83. Cost per ton 1912, development $1.86, mining $5.64, milling $0.58, general $1.07, total $9.15. The mine has been in active operation for the past twenty years and has produced several million dollars in gold. Victor mine to the east.

Milkmaid and Franklin, also known as the *Western,* has been a gold producer for many years, being one of the early discoveries in the French Gulch district. It is owned by the Western Exploitation Company, H. F. Musser, manager, and comprises 120 acres, consisting of the Milkmaid and Franklin groups, situated in Sec. 17, T. 33 N., R. 7 W., 3 miles by wagon road from the town of French Gulch. Elevation 1700 feet. Of the country rock, slate and granitic-porphyry form the hanging and footwall respectively. Two veins have been followed in the Franklin workings, one with a N. 5°–30° W. strike and a dip of 75° E., the other strikes W. The intersection of the two veins has not been discovered. The vein with the northward strike is in the western part of the workings and has been stoped for 70 feet on the main level. The other vein has been followed for 700 feet on the main level. The maximum width is 4½ feet, average 16 inches, but narrows down to a seam in places. The ore consists of ribbon quartz, carrying pyrites, and is free milling. The workings on the Franklin consist of a main adit about 1300 feet long, and two shorter levels, connected by a raise on the vein and a 130-foot winze connecting the main level with the old level, also drifts and stopes, totaling several hundred feet of development work. Stopes as a rule are filled with waste.

The Milkmaid, which adjoins the Franklin on the east, has not been worked recently, but has been a producer in the past. One vein has a strike of N. 30° E., dip vertical, and has been developed with tunnels, drifts and stopes, also a 400-foot incline shaft sunk at an angle of 45°. Ore was rich and free, but the vein was small. The mine equipment consists of cars, tools, shop and dwellings. The reduction equipment consists of a new 10-stamp mill on the Milkmaid group. The operating power, electricity, is obtained from the Northern California Power Company. The stamps weigh 1100 pounds each, and drop at the rate of 102 times per minute for a distance of 6 inches, the ore being crushed through a 40-mesh screen and thence conveyed to four Frue vanners. Fourteen men employed. Considerable ore extracted by lessees in former years. Production in last five years about $350,000. Property adjoins the old Washington mine.

Bibl.; U. S. Geo. Surv., Bull. No. 540, pp. 35, 61, 63, 64.

Minnesota, in Secs. 1 and 2, T. 32 N., R. 6 W., 2 miles southwest of Copley, in the Flat Creek mining district, consists of 100 acres, patented. Owner, J. W. Parmalee. Five veins on the claims, four parallel, diorite footwall and granitic-porphyry hanging. Work confined to one vein having a strike of N. 40° E., dip 35° N. Pay shoot 150 feet long and 4 feet wide, free milling. Workings consist of a tunnel 1900 feet long, 1000 feet of drifts, raises, and a stope 150 feet long. Old 10-stamp mill idle. Producer at one time. Two men employed.

Mount Pleasant consists of 80 acres, in Sec. 32, T. 32 N., R. 5 W., 1 mile west of Redding, in the Shasta mining district. Owners, H. C. Cummings et al. Elevation 900 feet. Vein has a northwest and southeast strike and dips 45° E., slate footwall and quartz-porphyry hanging. Pay shoot 140 feet long and 3 feet wide, free milling. Workings consist of a tunnel 500 feet long and short drifts. One man employed.

Mount Shasta, one of the quartz producers of this county, is located in Sec. 33, T. 32 N., R. 6 W., about 3 miles south of the town of Stella. Owner, Mount Shasta Mining Company, of San Francisco; G. M. Vail, superintendent. The holdings consist of 120 acres, which were acquired from George Leversay, by the Mount Shasta Gold Mines Corporation. This corporation failed in 1905 and the mine was idle until 1911, when it was secured by the present owners. Elevation 2200 feet. There are two parallel veins on this group about 50 feet apart, strike N. 40° W., dip 40°–50° S., quartz-diorite footwall and granitic porphyry hanging. Pay shoot 400 feet long and 12 feet wide, low grade, free milling. Development work consists of a shaft 465 feet deep, seven levels, 300-foot drift on the seventh level, several stopes and short tunnels. Mine equipment consists of cage, wooden gallows frame, steam hoist, dwelling, etc. The 8-stamp mill, steam driven, is idle. Stamps weigh 1050 pounds each. Some ore blocked out. Four men working.

Bibl.: U. S. Geol. Surv., Bull. No. 540, pp. 39, 44, 46, 47–48.

Morton & Bliss, formerly known as the *Riley & Bliss,* consists of 100 acres, patented, in Sec. 1, T. 33 N., R. 6 W., 6½ miles west of Kennett, in the Backbone mining district. Owner, Bliss Estate, of New York. Elevation 2600 feet. Two parallel veins 3 feet wide, strike northeast and southwest, dip 40° E. Pay shoot 200 feet long and 3 feet wide, free milling. Workings consist of two tunnels on the vein 380 to 2400 feet long, 500-foot drift, raise and stope 200 feet long. Old 10-stamp mill idle. Stamps weigh 850 pounds each. Mill can be operated both with steam and water power, water from South Fork of Squaw Creek. Property has been a producer, but idle at present.

Murray consists of 120 acres, in Sec. 18, T. 32 N., R. 5 W., 1½ miles north of Keswick. Elevation 1000 feet. Owners, Mount Shasta Mining Company. H. C. Cummings, of Redding, manager. Vein about 6 feet wide, strike N. 40° E., dip 50° S. Pay shoot about 230 feet long, 6 feet wide, quartz-porphyry footwall and syenite hanging. Ore free milling but low grade. Developed by means of a tunnel 530 feet long, 200-foot drift and one short raise. Four men working. Small producer at one time.

Bibl.: Reports XII, p. 243; XIII, p. 362.

Nellie and *Annie,* consists of 80 acres in Secs. 1 and 2, T. 33 N., R. 7 W., 5 miles north of French Gulch, in the French Gulch mining district. Elevation 3200 feet. Owners, M. Welch et al., of French Gulch. The vein has an east and west strike and dips 60° S., slate footwall and granite-porphyry hanging. Pay shoot 230 feet long and 2 feet wide, ore free milling. A tunnel 340 feet long, and short drifts constitute the development work. A little production by lessees.

New York and *Skylark,* consisting of 60 acres, is located in Sec. 17, T. 33 N., R. 7 W., 4 miles northwest of French Gulch, in the French Gulch mining district. Elevation 2800 feet. Owner, W. Richards. Two parallel veins about 200 feet apart strike east and west, dip 60° N., slate walls. Ore shoot 180 feet long and 5 feet wide, low grade, free milling. Workings consist of a tunnel on the vein 340 feet long, a 40-foot winze and 1 stope. Production record small. Idle.

Niagara, formerly known as *Black Tom,* was at one time one of the famous quartz producers of the French Gulch mining district, but has been idle since 1905. This group, consisting of 410 acres, patented, is located in Secs. 1, 6, 7, 8, 15 and 18, T. 33 N., R. 7 W., about 4½ miles by road from French Gulch. Elevation 2800 feet. It is on the same hill as the Washington mine, and the claims were located in 1857. Owners, W. W. Bunzoine et al., of French Gulch. The vein system is not well defined. The main veins, two in number, one on the Niagara, and the other on the Scorpion claims, have been worked. The strike is northeast and southwest, dip N. 70° W., footwall is granitic-porphyry and hanging-wall is slate. The ore is free-milling with some pyrites. Ore shoot 200 feet long and 3 feet wide. Workings consist of six tunnels, four being crosscuts from 150 to 2200 feet in length, 2000 feet of drifts, several stopes and raises. Tunnel on Niagara claim is 1662 feet long. The reduction equipment consists of four old stamp mills, 18 stamps in all, steam driven. Mine said to have produced over $1,000,000 in gold. Maximum depth about 500 feet. Said to be on the same lead as the Washington mine.

Bibl.: Reports X, p. 636; XI, p. 50; XII, p. 253; XIII, p. 263. U. S. Geol. Surv., Bull. No. 540, pp. 35, 37, 44, 67.

North Star consists of 60 acres, in Sec. 18, T. 31 N., R. 6 W., 4 miles northwest of Igo, at an elevation of 1600 feet. Owner, J. W. George. One vein in syenite and slate, but slightly developed, short ore shoot, little high grade extracted. Idle. Prospect. Mentioned in our Report XIII.

Bibl.: Report XII, p. 253.

Old Spanish, formerly known as *Deakin & Taylor,* and as *Enright,* is located in Sec. 31, T. 32 N., R. 5 W., 2 miles west of Redding. Owner, J. Sallee. Holdings consist of 60 acres, at an elevation of 800 feet. Vein 5 feet wide, strike north and south, dip 45° E., slate walls. Pay shoot 140 feet long and 5 feet wide, low grade, free milling. Workings consist of a 460-foot tunnel, 600 feet of drifts and 1 stope. Old 4-stamp mill. Idle. Property a producer at one time.

Bibl.: Report XII, p. 246.

Olive, consisting of 80 acres, is located in Sec. 19, T. 32 N., R. 5 W., 1½ miles southwest of Keswick. Elevation 1100 feet. Owner, Wright Estate. Three parallel veins, granite footwall and schist hanging. Pay shoot 230 feet long and 6 feet wide, low grade, free milling. Old 4-stamp mill idle. Small producer several years ago.

Oro Fino consists of 60 acres in Sec. 34, T. 32 N., R. 6 W., ½ mile east of old town of Shasta. Elevation 1200 feet. Owner, C. H. Berhrens. Two parallel veins, quartzite footwall and hornblende hanging, east and west strike, and a dip of 60° S. Pay shoot 200 feet long and 2 feet wide, ore free milling. Only slightly developed by means of three tunnels on vein, longest 700 feet. One man working.

Bibl.: Report XI, p. 44.

Oro Vista, in Sec. 36, T. 32 N., R. 6 W., ½ mile southeast of old town of Shasta, consists of 60 acres. Elevation 1600 feet. Owner, N. D. Fowler. Three parallel veins, strike east and west, dip 85° N. Pay shoot 170 feet long and 4 feet wide, low grade, free milling. Workings consist of a tunnel 530 feet long, and short drift. Two men employed.

Potosi consists of 60 acres, patented, in Sec. 15, T. 31 N., R. 6 W., 1½ miles northwest of Centerville, in the Igo mining district. Elevation 1000 feet. Owner, E. P. Jones. One vein, slate footwall and granitic-porphyry hanging. Pay shoot 100 feet long and 1 foot wide; some high grade extracted. Short tunnel and 90-foot shaft comprise the workings. Idle.

Bibl.: Reports XII, p. 254; XIII, p. 363.

Princess (drift and hydraulic) mine consists of 300 acres, patented, in Secs. 25 and 26, T. 31 N., R. 6 W., 1 mile south of Centerville. Owner, I. Baer. Course of channel is northeast and southwest, granite bedrock; depth of gravel, 30 feet. About 40 acres worked. Workings consist of an old tunnel on bedrock 600 feet long, drifts and old shafts 50 feet deep. Water supply was obtained from Boulder Creek through a ditch 12 miles long. Owner had a permit from the debris commission, granted in 1901, to operate, but the retaining dam was condemned and the property has been idle since that time. Chapman & Voluntine hydraulic mine to the northeast.

Red Hill (drift and hydraulic) mine, formerly known as *Gardner Bros.,* consists of 60 acres, in Sec. 1, T. 30 N., R. 7 W., ½ mile northeast of town of Ono. Owners, M. Gardner et al., of Ono. Course of channel northeast and southwest; soft granite bedrock, gravel 20 feet deep. Water obtained from Eagle Creek through a ditch 2 miles long. Formerly worked as a hydraulic mine, but on account of the debris law it is operated by drifting. In operation during the winter months. Small producer.

Bibl.: Reports XII, p. 255; XIII, p. 363.

Reid, in Sec. 3, T. 32 N., R. 5 W., 2 miles southeast of Copley, in the Flat Creek mining district, consists of 140 acres. Owner, J. M. Selnave. Elevation 1900 feet. Three parallel veins, strike N. 40° E., dip 35° E. Pay shoot 200′ long and 2′ wide, free milling. Bonded to Geo. Bayha. Two men working.

Ruby and Pearl consists of 100 acres, in the Shasta Forest Reserve, in Sec. 4, T. 38 N., R. 5 W., 6 miles north of Castella. Owner, J. Wall. Elevation 5500 feet. One vein, strike northwest and southeast, dip 40° E., granite walls. Pay shoot 80 feet long and 1 foot wide, ore free milling. Developed by means of one tunnel 400 feet long on vein, and short drifts. Bryan mill, capacity 5 tons daily. Idle. Small producer.

Sam Houston, in Sec. 34, T. 33 N., R. 5 W., about 2 miles east of Copley, in the Flat Creek mining district, consists of 80 acres. Elevation 1000 feet. Owners, Sam Houston Mining Company of San Francisco. Three veins, quartz-porphyry walls. Pay shoot short, similar to the Garfield prospect. A little ore in sight. Idle.

Scottish Chief consists of 120 acres, patented, in Sec. 31, T. 33 N., R. 5 W., ½ mile northwest of Copley, in the Flat Creek mining district.

Elevation 900 feet. Owner, W. Menzel. One vein 2 feet wide, strike northwest and southeast, dip 75° E., granite walls. Pay shoot 80 feet long and 2 feet wide, free milling ore. Workings consist of a tunnel on vein 800 feet long, drift and stope. Old 3-foot Huntington mill. Idle. Small producer at one time, but the property has not been worked recently.

Shasta Dredging Company, operating on the old Quinn ranch, owns 400 acres of land along Clear Creek, in Secs. 31 and 32, T. 31 N., R. 5 W., about 4 miles southwest of Redding, in the old Horsetown district. This property was operated for a time by the California and Detroit Mining Company, but their suction dredge proved a failure and the present owners acquired the holdings in 1902. A. S. Newsome, president; W. A. Palmer, manager; and J. Heaton, superintendent of dredge for the company. Home office, San Francisco. The course of the channel is east and west, slate and sandstone bedrock tilted. Pay gravel about 20 feet deep. About 100 acres have been worked. Dredge equipped with 5-cubic foot buckets and 6′ x 30′ screens. Power from Northern California Power Company. Boat handles about 60,000 cubic yards per month. Twelve men employed. Three new hulls have been built by present company. Ground worked in the early days with rockers and was rich.

Bibl.: Bull. No. 57, p. 216.

Silver Falls, formerly known as *South Fork,* consists of 240 acres, in Sec. 20, T. 31 N., R. 6 W., 2 miles northwest of Igo. Owners, Silver Falls Mining Company, of Redding; H. Rogers, president. Eight veins on the claims, granite walls. Workings consist of 600-foot tunnel and drifts. Two men working. Small producer. Atlantic to northeast.

Siskiyou and Nightingale consists of 40 acres in the Shasta Forest Reserve, in Sec. 2, T. 35 N., R. 6 W., 7 miles west of Dog Creek Railroad, in the Dog Creek mining district. Elevation 2200 feet. Owners, Glenn County Mining Company; home office, Millsaps; Geo. Millsaps, president; A. Luce, secretary. Five veins on the claims. Strike of main vein east and west, dip vertical, slate footwall and andesite hanging. Pay shoot 450 feet long and 3 feet wide, free milling. Workings consist of five tunnels on vein from 100 to 500 feet long and four drifts. Two men employed. Active development work to be pursued. Delta Consolidated to north and Trinity Consolidated to south.

Slattery & Welch (hydraulic) mine consists of 30 acres, in Sec. 8, T. 33 N., R. 6 W., about 5 miles northeast of French Gulch, in the French Gulch mining district. Owners, Slattery & Welch, P. J. Slattery, superintendent. Course of channel northeast and southwest. Pay gravel from 5 to 10 feet deep. Water obtained from Clear Creek and

Klines Gulch through a ditch 3 miles long. Only worked for a short time during the winter season. Some coarse gold found. Small producer.

Slide consists of 100 acres, patented, in Secs. 7 and 8, T. 32 N., R. 5 W., 1 mile north of Keswick. Owner, J. McCreary. Pay shoot 110 feet long and 2 feet wide, free milling, granitic-porphyry walls. Workings consist of a tunnel on vein 700 feet long and 600 feet of drifts. Two men working. Prospect.

Summit and Montezuma, midway between the Brunswick and Niagara mines, is located in Sec. 17, T. 33 N., R. 7 W., 5 miles west of French Gulch, in the French Gulch mining district. Elevation 4200 feet. Holdings consist of 60 acres, patented, under lease to Allen & Alexson. Property owned by Porter & Wheeler Estate, of Redding. Two parallel veins on this group, strike northeast and southwest, dip 70° N. Ore shoots are short and 8 inches wide, free milling, some high grade found, a 3-ton lot giving returns of $423 per ton in gold. Workings consist of three adits about 40 feet apart, 200-foot drift and a stope 40 feet long. The lessees have the ore milled at the Washington mill.

Bibl.: Report X, p. 641; U. S. Geol. Surv., Bull No. 540, pp. 35, 37, 44, 67.

Sunday Gulch, a recent location, consists of 300 acres, in Sec. 10, T. 29 N., R. 10 W., 3 miles southeast of Harrison Gulch. Owners, Victor Mining Company; J. H. Sharp, president; A. L. Fletcher, superintendent. Four parallel veins, strike N. 70° E., dip 45° S., main vein is 4 feet wide and gave returns in places, on the surface, of $8 per ton in gold, slate footwall and diabase hanging. Prospect, just being developed by means of short tunnels. Two men employed.

Sunny Hill, formerly known as *Summit* and *Gray Eagle,* consists of 100 acres in Sec. 1, T. 30 N., R. 8 W., about 7 miles west of Ono, in the Ono mining district. Owner, M. Mariscano, of San Francisco. One vein 1 foot wide, strike north and south, dip vertical, hornblende schist footwall and granitic-porphyry hanging. Pay shoot 80 to 100 feet long, ore free milling. Workings consist of tunnel 530 feet long, 300 feet of drifts and one stope. Elevation at tunnel 4500 feet. Reduction equipment consists of two 5-foot Huntington mills run by water power; water from Jerusalem Creek. Producer at one time; some high grade ore found. Two men employed.

Bibl.: Reports XII, p. 257; XIII, p. 365.

Tanglefoot, consists of 60 acres in Sec. 12, T. 30 N., R. 8 W., about 8 miles southwest of Ono. Owner, W. M. Lee. Two parallel veins about 200 feet apart, strike N. 40° W. dip 50° E. Pay shoot 60 feet long and 10 inches wide; free milling; some high grade ore extracted. Only slightly developed with a tunnel 450 feet long. Idle.

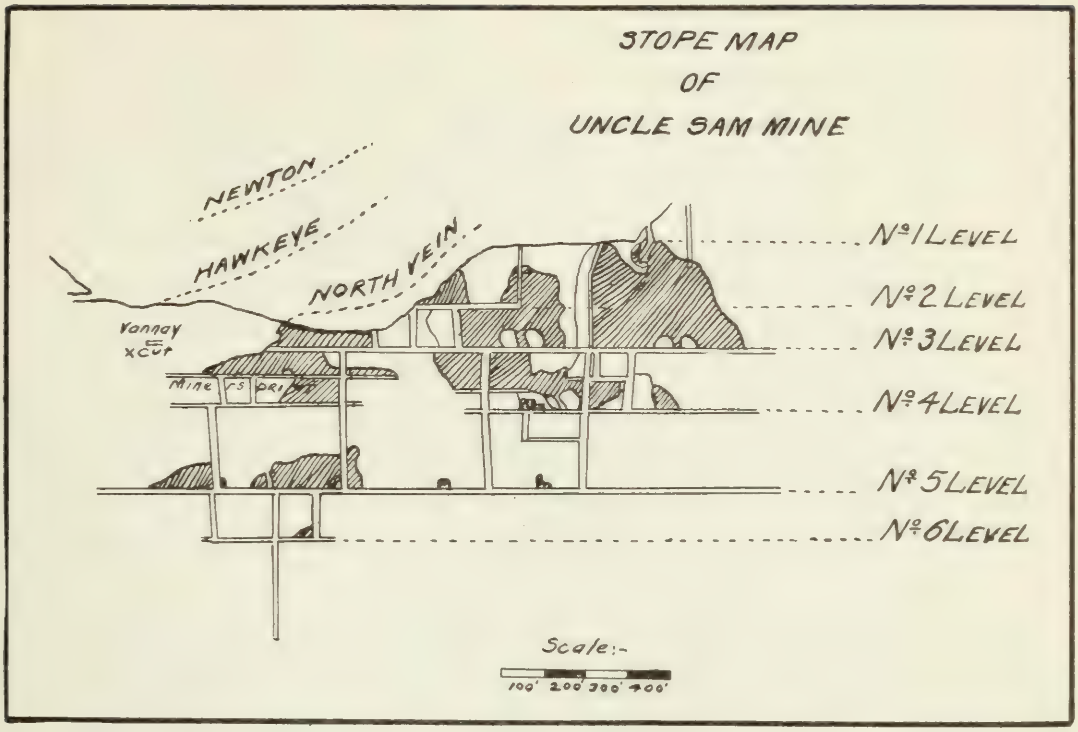
Texas Consolidated, one of the old gold producers of Shasta County, is located in Secs. 32 and 33, T. 33 N., R. 5 W., about 1 mile east of Copley, in the Flat Creek mining district. The holdings consist of 220 acres, patented; elevation 1800 feet. Owned by the Texas Consolidated Mining Company, C. E. Jarvis, president. Home office, Cleveland, Ohio. There are four known veins on this group. The main vein has a N. 50° E. strike and dips 70° E., width 4 feet, quartz-porphyry walls. Pay shoot 340 feet long and 4 feet wide, ore free milling. The development work consists of a tunnel on the main vein 4000 feet long, several thousand feet of drifts, raises and stopes. The mine equipment consists of all necessary machinery, shop and dwellings. The reduction equipment consists of a 20-stamp mill, driven by electricity; eight Triumph concentrators, and an old 3-ton chlorination plant, all idle. Power obtained from Northern California Power Company. Mine under lease to Geo. Bayha. Four men employed. Some ore in sight.

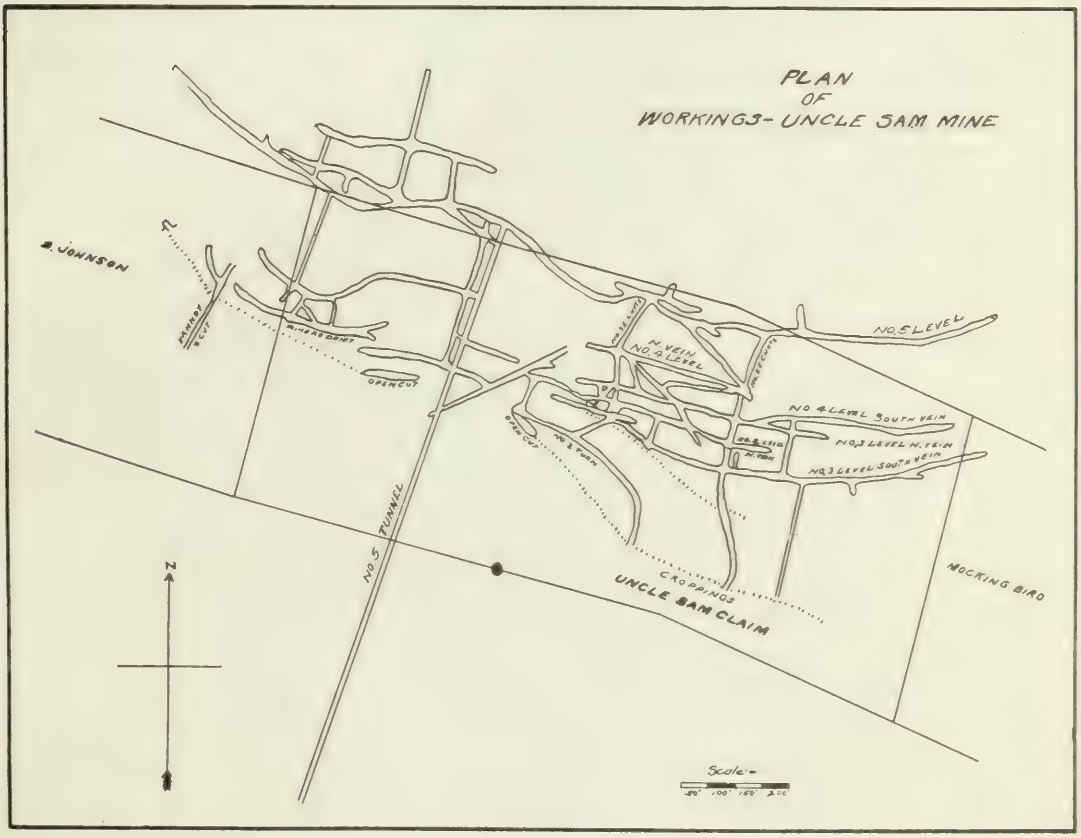
Bibl.: Reports X, pp. 629, 630; XI, pp. 43, 395-397; XII, p. 258; XIII, p. 365.

Three Sisters, consisting of 60 acres, patented, located in Sec. 15, T. 33 N., R. 7 W., 2 miles northwest of French Gulch, in the French Gulch mining district, elevation 1700 feet. Owned by Ellery et al., of French Gulch. Three veins on the claims carrying rich ore in spots. One pay shoot is 200 feet long and 18 inches wide, between granitic-porphyry walls. Workings consist of a tunnel 1350 feet long on the vein, 800 feet of drifts, a stope 200 feet long and a winze 120 feet deep; ore free milling. The 3½-foot Huntington mill, steam driven, is idle. Property has been a producer, but has been worked in only a small way since 1905.

Bibl.: Report XIII, p. 367; U. S. Geol. Surv., Bull. No. 540, p. 69.

Tom Green, adjoining the Brunswick mine on the west, is located in Sec. 15, T. 33 N., R. 7 W., 5½ miles west of French Gulch, in the French Gulch mining district. The holdings, consisting of 80 acres, located in 1887, elevation 4400 feet, are owned by J. E. Francks et al., of French Gulch; leased to W. P. Hight. Three parallel veins, but only one has been worked, strike north and south, dip 45° E., granitic-porphyry footwall and slate hanging. Ore shoot 210 feet long and 2 feet wide; ore is free milling. Workings consist of a tunnel on the vein 1900 feet long, drifts, stopes and a raise 80 feet in height. Old 10-stamp mill, steam driven, is idle. Worked by lessees since 1906. Three men employed. Small producer.


STOPE MAP
OF
UNCLE SAM MINE
NEWTON
HAWKEYE
NORTH VEIN
Vannoy
X Cut
Miners Drift
Nº 1 LEVEL
Nº 2 LEVEL
Nº 3 LEVEL
Nº 4 LEVEL
Nº 5 LEVEL
Nº 6 LEVEL
Scale:-
100' 200' 300' 400'


PLAN
OF
WORKINGS- UNCLE SAM MINE
S. JOHNSON
VANNOY X CUT
MINERS DRIFT
OPEN CUT
N. VEIN
NO. 4 LEVEL
NO. 5 LEVEL
NO 4 LEVEL SOUTH VEIN
NO. 3 LEVEL N. VEIN
NO. 3 LEVEL SOUTH VEIN
OPEN CUT
NO. 2 TUNN
N. VEIN
NO. 5 TUNNEL
CROPPINGS
UNCLE SAM CLAIM
MOCKING BIRD
N
Scale:-
50' 100' 150' 200'

Trinity Consolidated, consisting of 120 acres, patented, elevation 2400 feet, is located in Secs. 1 and 2, T. 35 N., R. 6 W., west of Delta, and 1½ miles west of D. C. R. R., in the Shasta Forest Reserve. Owner, Alden Anderson of Sacramento. Eight veins on the group, six being parallel, strike of parallel veins east and west, dip vertical, slate footwall and meta-andesite hanging, width 3 feet. Pay shoot 450 feet long and 3 feet wide, free milling ore. Workings consist of several tunnels on the vein from 50 to 450 feet long, drifts, raises and stopes. Maximum depth 160 feet. Reduction equipment consists of a 10-stamp Hendy mill, built in 1900; stamps weigh 1100 pounds. Mill operated by both steam and water power, water being obtained from Dog Creek through a ditch 1 mile long. Property has been a small producer. It is on the same lode as the Delta Consolidated. Advance group to the north and Siskiyou to the northeast. Idle at present.

Bibl.: Reports XIII, p. 367; U. S. Geol. Surv., Bull. No. 540, pp. 35, 37, 54, 55.

Truscott, formerly known as the *Emigrant,* consists of 40 acres in Sec. 25, T. 32 N., R. 7 W., about 6 miles northwest of Stella. Owner, John Martin, of San Francisco. Elevation at main tunnel 2600 feet. Two veins on the claims; the main vein has a strike of N. 20° E., dip 70° W.; the other vein is small and crosses the main vein at a slight angle, slate footwall and andesite-porphyry hanging. Pay shoot 100 feet long and from 5 to 10 feet wide, free milling, low grade. Development work consists of four tunnels 40 feet apart on the vein, from 50 to 610 feet in length, drifts and stopes. Property has been a producer. Two men working.

Bibl.: Report XII, p. 248.

Uncle Sam, one of the noted quartz mines of this county, is located in Sec. 1, T. 33 N., R. 6 W., 6 miles west of Kennett, in the Backbone mining district. Elevation 2300 feet. Present owners are the Dakin Company, of San Francisco, who control 140 acres of patented mineral ground. The mine was discovered in 1886 by J. Conant, who sold it to Dakin and his associates, and after working the property for a time it was acquired by the Sierra Buttes Mining Company. This company operated the mine for several years, producing over $1,000,000 in gold, from a maximum depth of 450 feet. A wagon road connects Kennett, a town on the Oregon Branch of the Southern Pacific Railroad, with the mine. Several veins, only one of which has been worked, strike N. 80° W., dip 55° NE., width 4 feet. Lode can be traced on the surface for 2000 feet. Ore is free milling. The development work consists of five tunnels, four on the vein, from 50 to 3000 feet long, one crosscut 400 feet long, drifts, raises and stopes (see map). The mine equipment is complete; compressor plant destroyed by fire in 1913. The reduction plant consists of a 20-stamp mill, four Frue vanners, old canvas and chlorination plants. Mill operated by electricity from Northern California Power Company. Stamps weigh 850 pounds each. Property operated for a time by a Portland company on a lease. Idle since May, 1913. Some ore blocked out. New ore shoot recently discovered.

Bibl.: Reports X, p. 639; XI, pp. 47, 395, 398; XII, p. 258; XIII, p. 367.

Utah and California, also known as the *Walker,* is located in Secs. 3 and 4, T. 32 N., R. 5 W., 2 miles southeast of Copley, in the Flat Creek mining district. Holdings consist of 270 acres, elevation 800 feet. Owned by Walker Bros., of Salt Lake City, Utah. Five veins on the group. Main vein has a north and south strike and dips 80° E., quartz porphyry walls. Pay shoot 300 feet long and 5 feet wide, low grade, free milling. Workings consist of a tunnel 2300 feet long on the vein, several thousand feet of drifts and stopes. Reduction equipment consists of 10-stamp mill and four Frue vanners, steam driven. Stamps weigh 1000 pounds each. Producer at one time. Idle.

Bibl.: Reports X, pp. 630-631; XII, p. 259; XIII, p. 368.

The Victor, adjoining the Midas mine on the east, consists of 250 acres, in Sec. 3, T. 29 N., R. 10 W., in the town of Harrison Gulch, in the Harrison Gulch mining district. Elevation at mine shaft 2600 feet. Owners are the Victor Power and Mining Company, J. H. Sharp, president; P. H. Coffman, secretary; A. L. Fletcher, superintendent; R. D. Jackson, consulting mining engineer. Home office, Red Bluff. Two veins on the group, known as the Baldwin and Gold Hill, strike N. 50° W., dip 75° SW., diabase walls, average width of veins 2 feet. Pay shoot 300 feet long and 2 feet wide. Ore free milling. Several faults, one being 400 feet wide. The development work consists of a shaft (4′ x 9′) which is 400 feet deep, five levels, 800 feet of drifts, 960-foot crosscut, raises and one stope 300 feet long. Shaft sunk on a 45° incline. The mine equipment consists of three distillate engines (15, 32 and 50 h.p.), hoist, 50-foot gallows frame, compressor, pumps, shop, dwellings. Reduction equipment consists of a 3-stamp Nissen mill and two Frue concentrators. Stamps weigh 1300 pounds each. Plant operated with distillate, costing 19¢ per gallon; use 100 gallons per day. Seven men employed. Property a small producer at present. The wagon road from Redding to Harrison Gulch passes through the Victor claim. Workings confined mainly to the Victor claim.

Washington, located in 1852, was the first quartz location in Shasta County and is one of the oldest mines in California. At one time it was the largest producer in the French Gulch mining district. The holdings consist of 82 acres in Secs. 16 and 17, T. 33 N., R. 7 W., 3 miles northwest of French Gulch. Elevation 2300 feet. Owners, Washington Gold Mining Company, of Redding: C. L. Watson, manager. Leased to Maxwell & Ketch. Two veins about 60 feet apart have been worked; one has a north and south strike, with a dip of 70° E. and has been worked only near the surface; the other has an east and west strike, with a north dip, and has been worked to a depth of 500 feet. The north and south vein seems to cut off the other. The east and west lead pinches in places and at times widens to 10 feet, being in a well-defined fault plane. The footwall is granitic porphyry and the hanging slate; ore is free milling. The workings consist of six tunnels from 300 to 2400 feet long, drifts, raises and stopes, comprising in all several thousand feet. The main tunnel caved in many places. One stope is said to be 400 feet long, 5 feet wide and 250 feet high. The reduction equipment consists of an old 10-stamp mill and two vanners; stamps weigh 850 pounds each. Custom ore treated in this mill. Mine said to have produced over $2,000,000. The first mining operations consisted in sluicing the rich and decomposed material on the outcrop. Some of the oxidized ore was rich, running at times over $600 per ton in free gold. Three men employed by the lessees. Milkmaid to the south.

Bibl.: Reports X, pp. 635-636; XI, p. 50; XII, p. 260; XIII, p. 368; U. S. Geol. Surv., Bull. No. 540, pp. 35, 37, 44, 64-66.

GRANITE.

The granite in Shasta County is generally of a light color, containing some hornblende and shows the effect of strong pressure, as the rock, when not decomposed, is much jointed and cross-jointed. It is not much used for building or monument purposes on account of fracture planes and quartz seams cutting through the rock.

Bibl.: Bull. No. 38, p. 53.

Masterton Quarry, consisting of 60 acres, is located in Sec. 20, T. 32 N., R. 6 W., about 1½ miles south of Stella. This deposit is very massive. Only the boulders are worked. Used for curbing and coping. Idle at present.

Jewel Quarry is located in Sec. 25, T. 31 N., R. 6 W., 2½ miles east of Igo. Massive deposit. Rock grayish in color and similar to Masterton deposit. It has not been worked for several years.

INFUSORIAL EARTH.

Several exposures of infusorial earth, locally called "chalk," are found in the northeastern part of this county, but more especially along both banks of the Pit River, near the mouth of Hat Creek, and up that creek for about 5 miles. Only a relatively small part of these beds is pure, the greater portion being mixed with sand. The beds are seldom over 10 feet thick and are interbedded with tuffs and basaltic debris. These exposures are especially prominent in Secs. 7, 17 and 18, T. 36 N., R. 4 E., M. D. M.

Bibl.: Bull. No. 38, pp. 296, 363.

IRON ORE.

The most prominent deposits of iron ore are found in close proximity to the McCloud Carboniferous limestones on both sides of the Pit River. There are also extensive surface indications of iron ore bodies, north of Pit and east of McCloud rivers.

Bibl.: Reports II, p. 195; IV, pp. 236, 259: Bull. No. 38, pp. 301–304. J. S. Diller, U. S. Geol. Surv., Bull. 213, pp. 130, 219, and Bull. No. 225, p. 178.

Noble Electric Steel Company, formerly known as *Shasta Iron Company,* owns 320 acres in Sec. 25, T. 34 N., R. 3 W., M. D. M., about 5 miles east of Pit. The Sacramento Valley and Eastern Railroad connecting Pitt, a station on the Oregon branch of the Southern Pacific Railroad, with the Bully Hill mine, passes through a portion of these holdings. John Crawford is superintendent for the Noble Electric Steel Company; home office, San Francisco. The iron ore lies between quartz-diorite and limestone (McCloud). The deposit is large and massive, consisting of iron oxide and magnetite, and is worked as a quarry, the ore being shot down and conveyed to the smelter a distance of ½ mile by means of an automatic tramway.

The method of treatment consists in retorting the ore in an electric smelter, using charcoal and carbon, electrically heated, thus igniting the charcoal, which is used as a means of reducing the ore. The carbons, two in number, are 6 feet long and 6 inches in diameter. No stack on the retort, as draft is obtained by means of blowers. A proper charge (charcoal, barren quartz and limestone fluxes) is charged simultaneously with the ore, so the whole is well mixed by the time it reaches the smelting zone. Tap furnaces three times and run the ore into sand pig beds. When it has cooled down so that it will not "bleed," the sow with its attendant pigs is lifted from each bed by grab-hooks and carried on a traveling crane. The iron is broken up by a drop, lifted by a magnet and transferred to the platform scales, where it is weighed. From here it is stacked according to grade, grading altogether by silicon content, as sulphur and phosphorus are very low. Grades run from No. 1 silicon, containing 4.5%–5% silicon, to foundry low with 1%–1.25% silicon. The iron is tougher, finer grained, and has a more homogeneous fracture than other charcoal irons. Daily production about 25 tons.

The furnaces are long and narrow, consisting of rectangular shell 25′ long, 10′ wide and 8′ high, battered four ways at the bottom to form a crucible. The portion above the bottom corresponds to the back or smelting zone of the blast furnace. The shell, lined with standard furnace brick, supports five charging stacks 18 feet high, and between these are suspended four electrodes which penetrate vertically into the charge. Electricity obtained from Northern California Power Company. Twelve men employed at present. Lime is also manufactured.

LIMESTONE.

Three parallel belts of limestone, having a general north and south strike, occur in the western half of this county. The most eastern belt is found on Cedar Creek, east of the Afterthought mine in the southern portion of T. 34 N., R. 1 and 2 W., and in Secs. 7 and 8, T. 34 N., R. 2 W., the furance flux for the Bully Hill mine coming from the latter sections. Another belt is found in Sec. 26, T. 33 N., R. 4 W., and can be traced for many miles, forming the McCloud bluffs, near the United States Fisheries. The most western belt crops out east of the Sacramento River in the northern part of the county, and is again found west of Kennett, on the south side of the divide between the two Backbone creeks. This deposit has been more extensively worked than any of the others, and is of good quality.

Bibl.: Diller, U. S. Geol. Surv., Bull. No. 196, p. 94; Bull. No. 213, p. 365; Bull. No. 225, p. 176. State Mining Bureau Bull. No. 38, pp. 88–91, 366; Vol. I of Paleontology of California, Whitney; Report XI, pp. 35-40.

Holt & Gregg Quarry is located in Sec. 32, T. 34 N., R. 5 W., and consists of 120 acres, patented, about 2 miles northwest of Kennett, on the south slope toward Little Backbone Creek, at an elevation of 2000 feet. This excellent limestone deposit, on the western belt, is owned by Holt & Gregg, of Redding; F. M. Kindelberger, superintendent. Quarrying method of mining used. The limestone is hauled to the kilns at Kennett, a distance of 2 miles, by means of an electric railway, power being obtained from the Northern California Power Company (see photo No. 7). The crude material is roasted in three Hoffman continuous kilns, crude oil being used for fuel. Lime removed every two hours. Output is 25 tons in twenty-four hours. Product is of an excellent grade and sold extensively throughout California. Thirteen men employed.

MACADAM.

The macadam used for the streets of Redding comes from the *Redding Municipal Quarry,* located in Sec. 29, T. 32 N., R. 5 W., 1 mile northwest of this city. The holdings consist of 30 acres, patented. The quarry work is under the direction of the superintendent of streets. The rock is altered, siliceous in character, and igneous in origin. The deposit is massive and easily worked. The equipment consists of a 300-ton ore bin, a rotary crusher of 250 tons capacity, air compressor, four machine drills, ½ mile of narrow gauge track and ore cars, all operated by electric power from Northern California Power Company. Only worked upon demand.

Photo No. 7. Holt & Gregg Lime Plant, Kennett.

Bibl.: Bull. No. 38, p. 324.

MANGANESE.

Manganese is reported on land owned by the Shasta Copper Company (Furber, White et al., of Redding), in Secs. 1 and 36, T. 33 and 34 N., R. 4 W., near Heroult. A shaft 30 feet deep constitutes the development work. Analysis of some of the ore shows:

20.00%	manganese.
34.00%	silicon.
6.72%	iron.
$1.65	per ton in gold.

MARBLE

Marble is found in Sec. 3, T. 33 N., R. 4 W., about 5 miles east of Kennett. The quality and extent is not known, as the deposit is considerably broken up on the surface and has not been developed.

Bibl.: Report VI, p. 98; Bull. No. 38, p. 107.

MINERAL SPRINGS.

Big Bend Hot Springs are located about 52 miles northeast of Redding, on land owned by J. E. Hill; post office, Big Bend. There are six mineral springs on this land, sulphur and iron, temperature 140° F. Good for rheumatism. No water bottled.

Bibl.: Report XI, p. 29.

Castle Rock is located in Sec. 15, T. 38 N., R. 4 W., about 2 miles north of Castella, at an elevation of 1900 feet. Owner, G. M. Parkinson. There are five mineral springs, waters contain sodium chloride, sodium carbonate, potassium, and a trace of lithium. Good for all stomach troubles. Daily flow 2000 gallons. Temperature 40°. Waters sold on the market.

Bibl.: Report XII, p. 346; Anderson, "Mineral Springs and Health Resorts of California," p. 119.

SANDSTONE.

A few miles northeast of Redding the Cretaceous Chico sandstone forms the surface rocks of Secs. 7 and 18, T. 32 N., R. 4 W. This deposit occurs in thick horizontal beds so that the quarrying of large blocks is a simple matter. Rock has a tawny color, quality is fair.

Bibl.: Bull. No. 38, p. 138.

At the *Texas Spring Quarry,* in Sec. 29, T. 31 N., R. 5 W., owned by California Sandstone and Construction Company of San Francisco, a little work has been done in the past, but the quality is not good on account of the number of niggerheads and fossils contained in the sandstone.

Bibl.: Bull. No. 38, pp. 138–139.

TUFF.

A belt of tuff extends from Clover Creek to Bear Creek, a distance of 5 miles, in Sec. 18, T. 31 N., R. 2 W.; in the forks of old Cow Creek, and South Cow Creek, a bluff of Tuscan tuff rises with steep sides from 30 to 50 feet high. The tuff has a light gray color and easily cuts to any desired form, but hardens on exposure. Being light, it makes a good building material for a temperate climate.

Bibl.: Bull. No. 38, p. 161.

ZINC.

A body of ore carrying zincblende and galena is found in Sec. 21, T. 34 N., R. 1 W. This ledge is 4 feet wide, strike east and west, dip 50° N. Slightly developed by means of a short tunnel. Country rock is shale.

Bibl.: Bull No. 38, pp. 355-356.

The ore of the *Donkey Mine* (Sec. 11, T. 33 N., R. 2 W.) carries considerable zinc, associated with copper, gold, silver and lead. This mine is listed under copper.

There is more or less *zinc* in the form of sphalerite associated with the ores of several of the copper mines of Shasta County, particularly at Bully Hill and at the Afterthought mine.

BIBLIOGRAPHY.

References: California State Mining Bureau Publications.

Report I. Page 15.
II. Pages 47, 159, 174, 181–182, 183, 186, 187, 188, 195, 200.
IV. Pages 14, 69, 112, 236.
V. Pages 67, 68, 70, 72, 87, 89, 93, 97–100, 101, 110, 112, 114, 115.
VI. Part I, pages 28, 30, 74, 95, 98, 99, 104, 105, 114, 115, 118, 120, 121, 129, 132, 134.
Part II, pages 63, 87.
VII. Pages 149, 150, 190, 191.
VIII. Pages 562–572.
IX. Page 39.
X. Pages 627, 638.
XI. Pages 24–53, 29, 395–399.
XII. Pages 61, 69, 70, 244–260, 327, 346, 377, 378, 395, 411.
XIII. Pages 50, 55, 61–63, 349, 270, 504, 519, 520, 557, 602, 610, 623, 626, 632, 637, 638, 646.

Bulletin No. 27, page 196.
No. 36, pages 98–100.
No. 37, pages 52, 105, 107.
No. 38, pages 53, 88–91, 107, 138, 139, 230, 256, 257, 270, 271, 296, 301–304, 324, 348, 360, 362, 363, 365, 366, 370, 371, 378.
No. 50, pages 38–114.
No. 57, pages 213–218.
No. 67, pages 12, 16, 18, 19, 20, 27, 29, 31, 32, 36–39, 42, 48, 53, 54, 69, 70, 74, 76, 81, 88, 109, 112, 122, 127, 131, 140, 150, 151, 180, 189.

Register of Mines, and map of Shasta County.

References: United States Government publications.

Graton, L. C.—The Occurrence of Copper in Shasta County, California, U. S. Geological Survey, Bull. No. 430, p. 71, 1910.
U. S. Geological Survey, Bull. No. 540, pp. 20, 21.
Diller, J. S.—Redding Folio No. 138, Geological Atlas U. S., U. S. Geological Survey, 1906.
Raymond, R. W.—Mining in the States and Territories West of the Rocky Mountains, p. 143, 1874.
Iron Ores of the Redding Quadrangle, California, U. S. Geological Survey, Bull. No. 213.
Mining and Mineral Resources in the Redding Quadrangle, California, in 1903, by J. S. Diller, U. S. Geological Survey, Bull. No. 225.
Lassen Peak Folio, Topo. Sheet, Redding, Red Bluff, U. S. Geological Survey, Bull. No. 507, pp. 99–101.
U. S. Geological Survey—Mineral Resources of U. S.

Year.	Page.
1902	178, 238.
1903	175, 176, 217.
1904	154, 165, 166, 168, 173, 177.
1905	115, 164, 165–169, 172, 173, 181, 182.
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1908 (Part I)	168, 194, 205, 206, 316, 318, 320, 321, 324–326, 347–349.
1909 (Part I)	132, 167, 168, 261–266, 268, 269, 282–285.
1910 (Part I)	349, 350–354, 357–359, 375, 378.
1911 (Part I)	465–476, 495–498.
1912 (Part I)	238, 239, 285, 290, 291, 308–310, 571, 572, 575–579, 584–586, 598, 602, 616, 626.

University of California Publications in Geography, August 7, 1914.
Vol. 1 of Paleontology of California, Whitney.
Mineral Springs and Health Resorts of California, Anderson, pp. 119, 169, 246.

SISKIYOU COUNTY.

Field Work in September, 1913.

INTRODUCTION.

Siskiyou County, with an area of 3040 square miles, lies along the northern boundary of California, and has Del Norte adjoining it on the west, Modoc on the east and Shasta and Trinity counties on the south. It has an exceedingly broken and picturesque expanse of mountains, and canyons cut by many streams running westerly to the Klamath River and southward to the Sacramento River, the former stream coursing through the county for 70 miles.

The most prominent mountain ranges are the Klamath, Scott and Salmon. Mount Shasta, in the southern part, having an elevation of 14,380 feet, is a noted landmark. The Sierra Nevada lava sheet covers a portion of the eastern part of the county, forbidding both mining and agriculture.

The mineral wealth, which constitutes the basis of Siskiyou's prosperity, is concentrated in various belts and districts. There are two main agricultural sections, the Scott and Shasta valleys, which afford supplies for the surrounding country.

Although the day of simple placer mining has passed, the auriferous gravels still provide the bulk of the county's gold output. Gold dredging is being successfully pursued on McAdams Creek, near Fort Jones; and as there are many acres of gravel that will yield handsome returns by this method of mining, dredging bids fair to become one of the important industries of the county.

Hydraulic mining has been extensively pursued along the Klamath River and important tributaries, and large areas of pay gravel still remain to be worked. The old method of river mining by means of wing-dams has practically passed out of existence.

Quartz mining, which really gives stability to the industry, has made wonderful strides in Siskiyou County during the past ten years, in spite of the lack of transportation facilities, especially railroads. The Oregon branch of the Southern Pacific Railroad, which crosses the county, connects at Montague with the Yreka railroad, thus affording a rail connection for Yreka, the county seat. Wagon roads to the remote mining districts are being constructed as rapidly as the funds of the county will permit.

The unusual strikes of "high grade" ore in the Salmon range, especially in the Homestake and Highland mines, has stimulated lode mining and given the county the publicity it deserves. The Black Bear, with a production record of over $2,500,000, is the most noted gold quartz producer in Siskiyou County. There are many prospects that should develop into producers with the expenditure of a moderate amount of money. The conditions for mining are ideal, due to the abundance of both water and timber, and the California-Oregon Power Company affords cheap electrical power to many of the mining sections.

The minerals found within the borders of this county are many and widely distributed, among which may be enumerated, gold, platinum, silver, lead, chrome, copper, and coal. There are several mineral springs also, the most famous being the Shasta, on the line of the Oregon branch of the Southern Pacific railroad.

GEOLOGICAL AND TOPOGRAPHICAL FEATURES.

The formation and metalliferous belts of Siskiyou County are not so clearly defined as in the middle counties of the State; the Coast and Sierra Nevada ranges are here merged into one. The strike of the stratification has been changed from west of north to north 20° east.

In the Klamath, Salmon and Scott ranges, the mountains are rough and sharply defined, and table lands are seldom seen, as sharp serrated ridges have replaced them, with deep gorges and precipitous canyons.

Though the mountains of the western half belong to the Coast Range system, their general geological character is that of the Sierras, as granites, diorites and metamorphic slates and limestones, similar to the latter mountain system, comprise their mass. Between these western mountain systems and the lava beds, which cover a large area, including much of the drainage area of the Shasta and Little Shasta rivers and Cottonwood Creek, is a section, the characteristic rock of which is a fossiliferous sandstone. In the Shasta and Willow Creek valleys coal seams are found, stratified with the sandstone; these seams of lignite (coal) of good quality, vary from a few inches to four feet in width and rest on a quartzite substratum, which formed the rim rock of the basin.

Following the quartzite in a westerly direction for about 1 mile, a belt of magnesian rocks containing iron is observed, which continues for some 2 miles, when the main gold-bearing belt of the region is encountered.

DESCRIPTION OF STREAMS.

Klamath River.

This river and its tributaries have been important agents in the distribution of placer gold throughout the country (see photo No. 1). Its source is in the mountain ranges of northern California and southern Oregon, drawing from the Upper and Lower Klamath, Goose and Rhett lakes, and flowing southwesterly into the Pacific Ocean at a point forming the western extremity of the dividing line between Del Norte and Humboldt counties. The length of the Klamath is some

362 miles, the average grade being 12 feet to the mile, 70 miles of which is in Siskiyou County.

Gold is found wherever the river has deposited gravel, whether it be in an old channel a thousand feet above the present stream, or in the river bottom. Below the mouth of Scott River it has cut its way through the northern end of the Coast Range practically at right angles to its trend, and runs through a narrow canyon from a few hundred to several thousand feet in depth, with banks as steep as the material will stand and which are covered with a dense growth of timber and brush. At Oak Bar, Happy Camp, Hamburg Bar, Orleans Bar and a few other points, the mountains recede far enough from the stream to admit of a few acres of level land being farmed; the rest of the country is too steep for cultivation.

Photo No. 1. Klamath River near Happy Camp.

Bibl.: Report VIII, pp. 582, 584, 585.

Scott River.

Scott River, one of the important tributaries of the Klamath, enters this stream in Sec. 6, T. 45 N., R. 10 W., M. D. M., at an elevation of 1650 feet above sea level. It has a length of 61 miles, an average course of 20° to the northwest, and is fed by a watershed area of 812 square miles, with 26 miles of tributaries. This stream flows through the mineral districts of Oro Fino, Quartz Valley, Callahan and Scott Bar. In the vicinity of Callahan, on the headwaters of this stream and especially on the South Fork, rich deposits of gravel are found, which have been mined for many years. Below Callahan the river runs through a portion of Scott Valley, a rich and fertile plateau, which is successfully cultivated, and in which are situated the flourishing towns of Etan and Fort Jones. The lower end of the river, for about 4 miles above its mouth, runs through a canyon, and here gold is found in the benches on the hillsides and in bars in the river. Scott Bar, in the center of this district and 2 miles from the mouth of Scott River, is the village from which supplies are distributed to the adjacent territory.

Bibl.; Report VIII, pp. 593, 594, 605, 606.

McAdams Creek.

This stream, a branch of Moffat Creek, tributary to Scott River, rises in the Forest Mountain Range and flows in a southerly direction. The placer ground on this creek, from its source to its junction, a distance of some 10 miles, has been rich, but the valley expands and the soil deepens so rapidly that only shallow depths were worked. It is good dredging ground, however, and the lower end of the stream is being worked by this method of mining.

Bibl.: Report VIII, p. 618.

Yreka Creek.

Yreka Creek, some 10 miles in length, rises in the Forest Mountains, flows in a northerly direction and empties into the Shasta River in Sec. 1, T. 45 N., R. 7 W., M. D. M. It is fed by several tributaries and has been an important gold producer in the past. Near Hawkinsville, 2 miles northeast of Yreka, the county seat, the valley is over 1 mile wide, and there is still a large area of auriferous gravel unworked, due to overburden and difficulty of drainage. Hydraulic elevators have been employed, with but poor success. The scarcity of water has also been another serious handicap.

Bibl.: Report VIII, p. 618.

Indian Creek.

Indian Creek, a tributary to the Klamath River, rises in the lofty snow-clad peaks of the Siskiyou Mountain Range, near the boundary line between California and Oregon. It has a length of 16 miles, flows in a southeasterly direction, and its tributaries, east and west, embrace 14 miles; its watershed area covers 144 square miles. Placer deposits are found along the entire length of Indian Creek. Happy Camp, a village on the west bank of the Klamath River at the junction of the Klamath and Indian Creek, is the distributing point for the country generally between Hamburg and Orleans Bar.

Bibl.: Report VIII, p. 599.

Beaver Creek.

This stream, a tributary to the Klamath River, rises in the Siskiyou Mountain Range, near Mount Sterling. It has a length of 12 miles, a general southwesterly course and is fed by the north and south forks of Hungary Creek, Bumble Bee, West Fork of Beaver and other smaller creeks. Placer mining has been pursued along these creeks for the past forty years, and although worked in a crude way considerable gold has been produced. The formations consist of granite, serpentine, slate and porphyrite-schist, cut by gold-bearing quartz ledges and porphyry dikes, which have fed these watercourses for ages.

Bibl.: Report VIII, p. 591.

Humbug Creek.

This creek, a tributary to the Klamath River, rises in the Humbug Mountains and flows in a northeasterly direction. It has a length of some 10 miles and has been a noted producer of placer gold. Near its source the banks of this stream are steep, the water being confined in a well defined canyon, of heavy grade, but as it approaches the river it widens out, forming large bars, which have been extensively mined. One claim of less than 7 acres has been constantly worked for the last thirty-five years, the output to date exceeding $260,000. Other creeks in this section tributary to the Klamath and which have been noted placer producers are Little Humbug and Barkhouse. From the head of Little Humbug over $2,000,000 was extracted by ground sluicing, and there is still considerable virgin ground to be worked, especially near its mouth, but there is only sufficient water in this creek to allow a two or three months' run each year. Barkhouse, the next creek below Little Humbug, has also been a noted producer, but mining operations are limited on account of the scarcity of water.

Bibl.: Report VIII, p. 591.

Mineral Production of Siskiyou County from 1894 to 1913 (incl.) from Records of State Mining Bureau.

Substances	1894	1895	1896
Gold	$760,781 83	$950,006 43	$1,091,264 82
Platinum	600 00	--------	--------
Silver	--------	177 30	652 65
Mineral waters	--------	80,800 00	--------
Totals	$761,381 83	$1,030,983 73	$1,091,917 47

Substances	1897	1898	1899
Gold	$842,123 00	$768,804 00	$991,771 00
Silver	34 00	321 00	100 00
Totals	$842,157 00	$769,125 00	$991,871 00

Substances	1900	1901	1902
Gold	$951,397 00	$886,043 00	$906,989 00
Silver	13,986 00	6,408 00	233 00
Mineral water	45,000 00	175,000 00	187,500 00
Copper			23 00
Totals	$1,010,383 00	$1,067,451 00	$1,094,745 00

Substances	1903	1904	1905	1906
Gold	$613,576 00	$892,685 00	$803,035 00	
Silver	22 00	1,230 00	2,499 00	
Mineral water	50,000 00	50,000 00		
Platinum		21 00	93 00	
Sandstone			1,250 00	$1,500 00
Totals	$663,598 00	$943,936 00	$806,877 00	$1,500 00

Substances	1907	1908	1909
Copper	$39 00		
Gold	398,017 00	$504,156 00	$416,160 00
Lead	140 00	183 00	144 00
Lime	1,000 00	1,680 00	300 00
Limestone	300 00		2,200 00
Mineral water	36,250 00	80,000 00	10,000 00
Rubble	39,000 00		500 00
Sandstone	12,897 00	1,485 00	1,750 00
Silver	3,037 00	6,125 00	2,145 00
Pumice stone			500 00
Macadam			4,528 00
Unapportioned, 1900–1909, inclusive			1,202,742 00
Totals	$490,680 00	$593,629 00	$1,640,969 00

Substances	1910	1911	1912
Crushed rock	$9,475 00	$6,580 00	
Gems	14,745 00	1,000 00	$250 00
Gold	437,376 00	422,297 00	472,314 00
Lime	735 00	120 00	
Limestone	525 00	24 00	
Mineral water	60,000 00	120,000 00	120,000 00
Sandstone	2,000 00	455 00	250 00
Silver	2,322 00	2,561 00	2,980 00
Chrome			2,310 00
Stone industry			609 00
Totals	$527,178 00	$553,037 00	$598,713 00

Substances	1913
Coal	$1,500 00
Gems	250 00
Gold	*180,125 00
Mineral water	120,000 00
Pumice stone	2,000 00
Silver	*1,228 00
Stone industry	4,883 00
Total	$309,986 00

*Production from dredging operations included in Stanislaus total.

ELECTRICAL POWER PLANTS.

The California-Oregon Power Company serves the following towns in Siskiyou County with cheap electrical power: Yreka, Montague, Hornbrook, Dorris, Ager, Hawkinsville, Thrall, Croy, Fort Jones, Oro Fino, Greenview, Walker, Etna, Weed, Sisson, Dunsmuir, and Castella.

The power plants are located at Fall Creek (capacity 2500 k.w.), Shasta River (380 k.w.), Klamath Falls (1500 k.w.), Gold Roy (2500 k.w.), Prospect (4750 k.w.), a total of 11,630 k.w. In addition to the plants mentioned, another is being installed on the Klamath River, near Fall Creek, with a capacity of 4000 k.w. and the system will then have a total generating capacity of 15,630 kilowatts.

CHROME.

Considerable float of chromite is found near the top of the Forest Mountains, in Sec. 13, T. 44 N., R. 8 W., Southern Pacific Railroad Company, owner; and in Sec. 18, T. 44 N., R. 7 W., Wm. Ramus and Carl Hill, Yreka, owners. The country rock is serpentine; the chromite is found in relatively small pieces. No development work has been done. Float of chromite is reported in the vicinity of the Dewey mine, about 10 miles southwest of Gazelle.

Bibl.: Bull. No. 38, pp. 272, 363.

CLAY PRODUCTS.

T. T. Garvey, of Yreka, owns a large bank of reddish colored clay, containing some minute quartz pebbles, in Sec. 27, T. 45 N., R. 7 W., M. D. M. A good quality of brick has been manufactured and used in Yreka.

Bibl.: Bull. No. 38, p. 257.

T. Hamilton, of Fort Jones, formerly made bricks from the surface clay from a deposit in Sec. 2, T. 43 N., R. 9 W.

Bibl.: Bull. No. 38, p. 257.

T. A. Reynolds, of Fort Jones, had an old brick kiln, using surface clay, from a deposit in Sec. 11, T. 43 N., R. 9 W.

Bibl.: Bull. No. 38, p. 257.

Peter Smith, of Etna, owns a bank of clay in Sec. 21, T. 42 N., R. 9 W., M. D. M. This deposit consists of 4 feet of clay of good quality, from which bricks were burned and used in buildings in Etna.

Bibl.: Bull. No. 38, p. 257.

J. Walker, of Greenview, has a deposit of grayish colored clay of good quality, located in Sec. 32, T. 43 N., R. 9 W., M. D. M.; a good grade of bricks manufactured at one time.

Bibl.: Bull. No. 38, p. 258.

COAL.

The coal deposits north of Yreka, in the vicinity of Hornbrook and Ager, have furnished a small amount of coal for domestic use for several years. It is a good grade of lignite, burns freely and leaves no klinkers.

The Black Butte Mountain Deposits near Ager, and the Kosh Creek deposits near Glazier along Kosh Creek in T. 38 N., R. 1 E., have not been developed at all.

The Siskiyou Coal Manufacturing Company's holdings near Hornbrook have been exploited by several open cuts along the croppings. The vein is 5 feet wide, with 30 inches of good lignite. Coal has been reported near Oak Bar, but is inferior in quality to the other deposits.

Bibl.: Report XI, p. 449.

COPPER.

The copper mines and prospects, while of recent development, are worthy of careful consideration, and are widely scattered over the central and northern portions of the county. The formations in which these deposits occur are either peridotite or gabbro, or a metamorphic schist overlying these eruptives, and several of the mountain peaks show the reddish-brown color which peridotite assumes in weathering. In the Happy Camp district, which has been noted for its placer gold production, there are several prospects of merit; and one property, the Grey Eagle, has been developed into a copper mine of considerable magnitude, with a large tonnage of ore blocked out.

Bibl.: Bull. No. 50, pp. 120–141.

Blue Ledge, owned by Blue Ledge Mining Company, of New York, is located in Sec. 21, T. 48 N., R. 11 W., M. D. M., in the Elliott mining district in the Siskiyou Mountain range and near the boundary line between California and Oregon. Elevation at mine is 4000 feet. Hutton is the nearest post office. The mine is connected by wagon road with Joe Bar, an old placer camp. The ore occurs in a north and south vein, dip vertical, its outcrop being traceable for 3000 feet; walls are micaceous schist. Ore consists of pyrite, chalcopyrite and other sulphides and oxides of iron and copper, the average value being above 6% copper and $5 per ton in gold. Two main tunnels 250 feet apart are connected by winzes and stopes; both show ore and have intermediate drifts showing over 150 feet in a solid body 40 feet wide in places. The workings comprise over 3000 feet of development. A large tonnage of ore blocked out. It is reported that the company has planned the erection of a smelter on the Applegate River.

Bibl.: Bull. No. 50, p. 128.

Copper Queen, in Sec. 3, T. 46 N., R. 7 W., in the Cottonwood mining district, 10 miles northwest of Hornbrook. Owners, J. D. and R. Abbott, of Yreka; comprises 20 acres on Hunter Creek; small ledge in lime and diorite-schist, 110-foot tunnel. Idle.

Bibl.: Bull. No. 50, p. 123.

Davis, in Sec. 12, T. 14 N., R. 6 E., in the Happy Camp mining district, 13 miles southwest of Happy Camp. Owner, R. Davis. Ledge 20 to 30 feet wide in schist and limestone; short tunnels; ledge not found in place as yet; strong gossan cropping, carrying some gold value; bonded to J. D. Farish and eight men employed; F. H. Dakin, superintendent; claims on Clear Creek.

Grey Eagle (formerly known as the *Dewey*), in Sec. 4, T. 17 N., R. 7 E., in the Happy Camp mining district, 8 miles northwest of Happy Camp. Owner, Incorporated Company, of New York; J. D. Farish, manager; Fred H. Dakin, superintendent; comprises 240 acres, patented; on Indian Creek at an elevation of 2550 feet; a strong vein from 10 to 80 feet wide in schist with a northwest and southeast strike and a dip of 45° E.; ore shoot over 300 feet long, consisting of chalcopyrite and pyrite; eight tunnels from 50 to 600 feet in length, six being crosscuts and two on the ledge; and several hundred feet of drifts and raises; large tonnage blocked out; ore carries from 2½% to 18% copper and $1.50 per ton in gold; strong gossan croppings on the surface; five men employed; property located in 1892 and sold to present company in 1908.

Bibl.: Bull. No. 50, p. 132.

Hummer, in Sec. 18, T. 40 N., R. 7 W., in Callahan mining district; owned by Mischler & Rollins, of Callahan. Claims worked to a limited extent by shallow shafts and open cuts; formation is serpentine, though the ore deposits are connected with dikes of quartz-porphyry which have penetrated the serpentine; ore lies in irregular bodies, consisting of pyrrhotite and other sulphides, carrying copper; ore said to contain nickel. Idle.

Bibl.: Bull. No. 50, p. 123.

Little, in Sec. 12, T. 46 N., R. 12 W., in the Seiad mining district; 10 miles west of Hamburg Bar. Owners, Little & Straisch; comprises 60 acres, located in 1899; ledge 39 feet wide, with northwest and southeast strike and dip of 20° E.; in schist and limestone; 40-foot tunnel. Idle.

Monarch, in Sec. 7, T. 40 N., R. 7 W., Callahan mining district; owned by Monarch Copper Mining Company, of Callahan; 240 acres, patented; tunnels and shafts (shallow); sulphide ore. Idle.

Bibl.: Bull. No. 50, p. 124.

Phillips, in Sec. 6, T. 46 N., R. 12 W., in the Seiad mining district; 14 miles west of Hamburg Bar. Owner, S. Phillips; comprises 40 acres, located in 1900; ledge 30 to 100 feet wide, with northwest and southeast strike and dip 35° E.; in schist and limestone; 110-foot tunnel; strong gossan cropping traceable for 1500 feet; only do assessment work.

Polar Bear, in Sec. 12, T. 40 N., R. 8 W., in the Callahan mining district; owned by Welkes & Sons; comprises one claim; ore bodies 6 feet wide, consisting of chalcopyrite and pyrrhotite, in serpentine; 200 tons extracted, said to carry 17% copper. Idle.

Bibl.: Bull. No. 50, p. 124.

Preston Peak, at head of South Fork of Indian Creek, 1½ miles north of Preston Peak; owned by Preston Peak Copper Mining Company; ledge 20 to 30 feet wide, in diorite; ores are pyrite and chalcopyrite; 300-foot tunnel in ore; ore said to carry 12% copper with gold; one of the pioneer discoveries of the Siskiyou belt. Idle.

Bibl.: Bull. No. 50, p. 132.

Plutus, in Secs. 12 and 14, T. 40 N., R. 8 W., in Callahan mining district; owned by McCarter, of Callahan; comprises five claims; ore, (pyrrhotite with small percentage of copper); occurs in gabbro and serpentine. Idle.

Bibl.: Bull. No. 50, p. 123.

Rainbow, in Sec. 24, T. 40 N., R. 5 W., in the Mt. Eddy mining district, 4 miles southwest of Sisson; owned by Wood & Sheldon Lumber Company; comprises 300 acres; tunnels and open cuts; one tunnel 400 feet long; ledge is 6 feet wide, in serpentine; ore is massive sulphides; gossan croppings 100 to 600 feet wide are exposed for over a mile on a spur of Mt. Eddy, having a strike of 70° NW. and dip of 60°; company's railroad near property; property was first worked for gold, thirty years ago. Idle.

Bibl.: Bull. No. 50, p. 125.

Rothrop, in Secs. 5, 6, 7 and 8, T. 43 N., R. 8 W., 4 miles northeast of Fort Jones; owned by George Henderson; comprises 15 claims; developed by shafts and tunnels; ledge 6 feet wide in serpentine; some of the ore is reported to carry 20% copper. Idle.

Bibl.: Bull. No. 50, p. 125.

Shiner, in Sec. 7, T. 46 N., R. 12 W., in the Seiad mining district; 12 miles west of Hamburg Bar. Owner, C. Shiner. Comprises 40 acres, at an elevation of 2000 feet; located in 1899; ledge 30 to 100 feet wide, with northwest and southeast strike and dip of 30° E., in schist and limestone; 80-foot tunnel; strong gossan cropping; ore is chalcopyrite. Only do assessment work.

Tebbe, in Sec. 32, T. 4 N., R. 9 W., in the Oak Bar mining district; 4 miles north of Oak Bar. Owner, G. A. Tebbe. Comprises 40 acres; ledge 30 feet wide in schist and limestone; 120-foot tunnel in ore. Idle.

Welch, in Sec. 1, T. 46 N., R. 12 W., in the Seiad mining district; 14 miles west of Hamburg Bar. Owner, E. Welch. Comprises 40 acres, located in 1899; ledge 30 feet wide, with northwest and southeast course and dip of 40° E.; in schist and limestone; two tunnels, 30 and 60 feet long; strong gossan cropping. Only do assessment work.

Yellow Butte, in Sec. 25, T. 40 N., R. 5 W., 15 miles from Montague, on the north slope of Mount Shasta; owned by Yellow Butte Mining Company; L. D. Ball, superintendent; vein is 5 feet wide, in schist and granite; strike north and south; dip 60° W.; ore is massive sulphide; tunnels and shafts. Idle.

Bibl.: Bull. No. 50, p. 126.

GOLD.

The main gold-bearing belt of Siskiyou County consists of metamorphic slates, granites, diorites, and limestones, with occasionally intrusive masses of porphyry, trap and syenite. This belt is from 5 to 12 miles in width and about 60 miles long, widening and narrowing at places on its line of strike, which varies from N. 20° to 30° E. In some places it is veined and seamed with stringers of quartz; in others it is soft, carrying talc in excess, with irregular bunches of quartz, rich in gold, designated in hydraulic mining as "seam diggings" and being easily worked with a stream of water under a heavy pressure head. In other localities on the belt, where the formation has been fissured, or near the line of contact, quartz veins occur either singly or in groups, and as a rule are small, but rich in gold.

This belt is interrupted and broken at several points and is by no means prolific in auriferous quartz veins throughout its entire extent, nor do the same rocks prevail in all the quartz districts.

A striking feature of the occurrence of the auriferous veins is their relation to the culminating peaks of the mountain systems crossed by the belt, for they conform to the lines of foliation of the ranges, being especially noticeable in the Salmon Range, New River, Knownothing, Deadwood and Humbug districts. Quartz Valley and Oro Fino, on opposite sides of a minor isolated mountain, are the only exceptions to the rule indicated.

Salmon Mountain, composed of eruptive rocks, porphyries and granites, seems to have been a disturbing element, as auriferous rocks do not come to the surface for about 10 miles beyond. Reaching as far as the known southerly limit of this gold-bearing belt extends, and crossing it, a belt of argillaceous slate and porphyry, having a width of 2 miles, is encountered, and then a decided belt of serpentine from 3 to 6 miles in width is entered, traceable for several miles on its line of strike. A belt of micaceous schist is observed at Scott's Bar, and westerly from this point belts of granite, limestone, and syenite are alternately crossed, until another belt of auriferous slates is entered, which has been but slightly prospected.

DESCRIPTION OF MINING DISTRICTS.

Salmon River District.

This district, the largest in Siskiyou County, comprises its entire southwestern corner, and includes the drainage area of the Salmon River and its tributaries. Topographically, it is a tangle of mountain ridges separated by precipitous canyons and river gorges. A wagon road 43 miles in length connects Etna, in Scott Valley, with Forks of Salmon, a small town located at the junction of the North Fork of the Salmon River. All the fairly level land in the district consists of a few bars on the Salmon River and its branches, so that this section is practically dependent on supplies from the outside.

Its mining industry, which is much scattered, is diversified among the several branches of placer and quartz mining, the former being followed along the Salmon River and its two principal branches, and to a less extent in some of the smaller side canyons making up into the gold-bearing quartz belts; large deposits are still untouched on the main river and on the South Fork. It is in quartz mining, however, that the permanent value of the district is to be realized. The main gold-bearing rock belt of the county crosses through the middle of this section.

In the geological center of the district, in the vicinity of Sawyer's Bar, several noted gold producers have been developed. They lie at the heads of Black Bear, Eddy's and White's gulches, from 4 to 10 miles distant from Sawyer's Bar. Quartz ledges on Jackass Gulch on the north side of the North Fork are being prospected and some pay ore developed. The Black Bear, Klamath, Gold Ball, Fagundez, Uncle Sam and Gold Run are the noted mines in this location. There are a number of prospects, also, which may develop into producers. In the same district near Snowden the recent strikes of "high grade" ore have caused considerable excitement. The Homestake, Highland, Overton, Zarina and Advance are the best known quartz properties, while the Big Cliff and Hardscrabble comprise two of the many promising prospects.

As a rule the country is heavily timbered and brushy, precipitous, and the surface broken, so that the quartz veins rarely show in place at the surface.

Bibl.: Report XI, p. 423.

Quartz Valley.

This district, occupying the northwest corner of Scott Valley, has two distinct kinds of placer mines. At the southern end of the valley the pay gravel lies on a flat, nearly level bedrock, without defined channel rims, covered with 60 feet of soft pebbly gravel and alluvium. The gold is coarse and water-worn and the deposit has been worked by drifting. Its source is probably the gravels of an old buried river, traces of which are observable in Douglas Hill, and in benches on the west side of the valley north of where Shackelford Creek enters it. Other traces of this old channel are found on the western edge of Scott Valley as far south as Callahan. The main placer deposit lies on the eastern side, and appears to be the result of the direct erosion of the ferruginous limestones that compose the western slope of the mountain separating Quartz Valley from the main Scott Valley. These limestones are seamed with auriferous quartz veins for some 5 miles. On the eastern slope of this mountain only one ravine seems to have been eroded deep enough to get to the gold bearing rocks, but on the Quartz Valley side there are four such ravines. These places consist of angular fragments of country rock and quartz with sand and clay, in depth from 1 to 30 feet, covered with a deposit of clay and surfaced with alluvium. The shallow placers near the heads of the ravines were worked out by the early-day miners. The gold is generally fine, rough and angular; and at one point from 8 acres of ground, over $200,000 was extracted, by means of hydraulic elevators.

Bibl.: Report XI, p. 434.

Oro Fino.

A low range of hills separates Quartz Valley from Oro Fino. This district is 22 miles southwesterly from Scott Bar by the course of the river. The auriferous dirt is evidently derived from the erosion and decomposition of the mountain sides in the immediate vicinity, as but few pebbles or gravel that show the action of running water or wash are found intermixed. A small ravine tributary to Oro Fino Creek constitutes practically all the placer ground in this district, and mining operations have been confined to the use of hydraulic elevators. The average fineness of the gold in this district is 785. Hydraulic washings have yielded from 75 cents to 85 cents per cubic yard of gravel. The two principal placer mines are the Eastlick Brothers and the Wright & Fletcher. The quartz veins, while numerous, all carry more or less gold and are small, and the gold generally occurs in pockets, in the limestone. The Green Mountain Tiger and Johnson have been the main quartz producers in this section.

Bibl.: Report VIII, p. 607; XI, p. 437.

Scott Bar.

This district, containing both placer and quartz mines, is situated on Scott River just above its junction with the Klamath, and was the first locality to be mined in Siskiyou County; it has been a remarkably rich district, although it includes a very small area (see photo No. 2). The gold, generally found on the bedrock, occurs in the form of nuggets, and is smooth and water-worn.

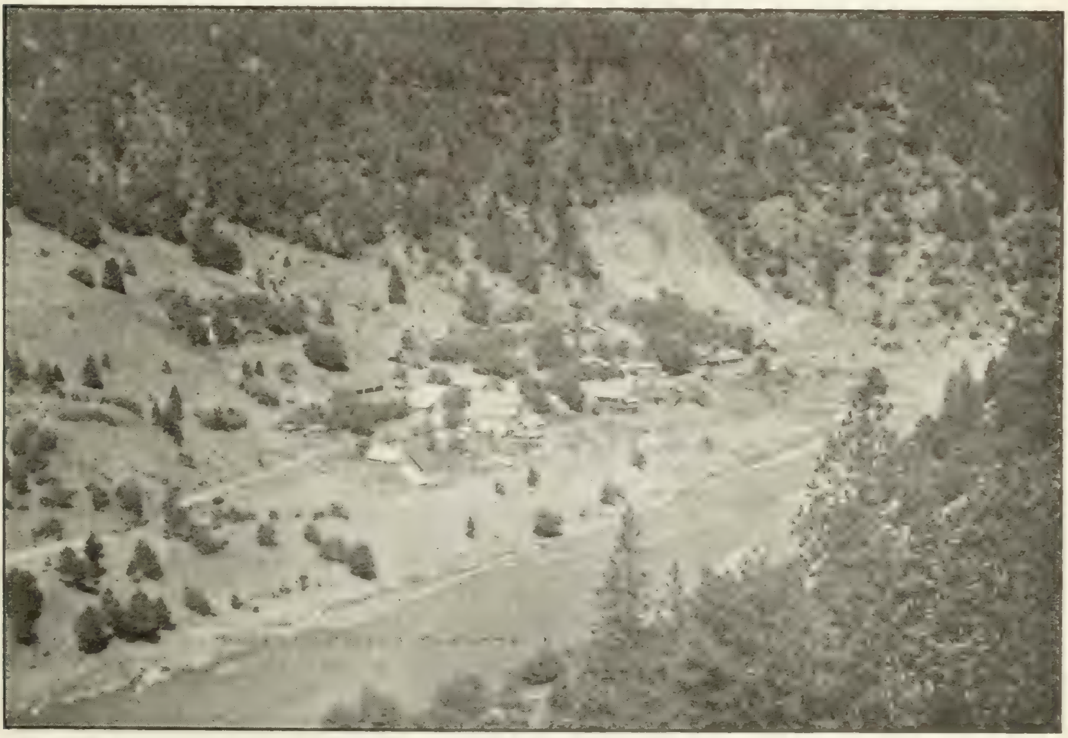


Photo No. 2. Scott Bar.

There are several large quartz ledges on Quartz Hill, which is across the river from Scott Bar, and one ledge is said to have yielded the Quartz Hill Hydraulic and Quartz Mining Company considerable gold. The surface has been rich hydraulic ground.

Bibl.: Report VIII, p. 605; XI, p. 447.

Humbug Creek.

This district, on the northeastern slopes of Old Baldy, is exclusively a quartz mining region, and is situated in the headwater forks and canyons of Humbug Creek, about 16 miles northwest of Yreka. The first mining in the district was carried on in 1854, and since that time considerable gold has been produced, although the operations have been practically confined to surface workings, due to a theory that the pay ore did not go down. As a matter of fact, a more intelligent exploration of the ore bodies has disproved the conclusions of the pioneer miners, and the properties that have been worked to any depth at all have yielded good returns, the Spencer and Mountain Belle mines being examples. The ledges in the serpentine are small, averaging 1 foot in width, and upon reaching the water level carry the gold largely with the sulphurets. The adjacent slates and granites are full of ledges carrying low-grade gold ores. The sulphurets consist of pyrite, blende and galena.

Bibl.: Report XI, p. 444.

Cottonwood.

This district, containing both placer and quartz mines, is located on the north side of the Klamath River, some 20 miles northeast of Yreka, and to the west of Hornbrook, a station on the Oregon branch of the Southern Pacific Railroad. It was originally noted for its rich, shallow diggings in Cottonwood Creek and the ravines tributary to it from the west. The old blue lead channel, famous for its rich gravel, is here exposed by erosion of the sandstone capping and cut through by the Klamath River. The gravel is blue and strongly cemented and compacted, while the bank contains considerable pipe clay hardened almost to the consistency of stone and filled with angular rock fragments. The gold is coarse, occurring mostly on or close to the bedrock. Both the channel and the capping are considerably displaced, and dip on an angle of about 12° to the east. In 1887 the outlet of the channel was discovered on the Klamath River, although the blue gravel had been mined in one of the ravines tributary to the Cottonwood, several years previous to that time. Some of the gravel on the bedrock gave returns of $6 per cubic yard.

The quartz prospects have been only partially developed and there is but little mining activity in this district at the present time. The country rocks, slate and quartz-porphyry contain many quartz ledges which carry gold values sufficient to warrant careful investigation.

The *Hazel*, with a gold production record of over $500,000, is the only quartz property that has been worked to any extent.

Bibl.: Report XI, p. 448.

Callahan.

The placer mines in this district are confined to the old gravel channel and bars of the South Fork of Scott River. The channel and high bars of the main Scott River, below the junction of the South and East Forks at Callahan, was mined for a distance of 3 miles, and a large annual gold output obtained. The high bars have been worked out and abandoned for a number of years, and the gold in the river channel is at such a depth that it cannot be profitably mined. On the South Fork, a few claims in the gulches and high bars are worked whenever water is available. On Jackson Creek, one of the headwater streams of the South Fork, 7 miles above Callahan, hydraulic mining is pursued on a small scale. The Montezuma River claim, 1 mile southwest of Callahan, was the largest gold producer, having a record of $50,000 annually.

Bibl.: Report XI, p. 433.

Happy Camp.

This district, also known as Indian Creek, is situated at the confluence of Klamath River and Indian Creek, some 70 miles west of Yreka, and contains both placer and quartz mines. The shallow and more easily removed gravel deposits have been worked out, but the benches are still being hydraulicked for their gold content. There is a large expanse of mineral land yet to be developed. The shallow diggings yielded large returns and were worked over by the Chinese after being abandoned by the white miner. The Classic Hill, on Indian Creek, one of the famous hydraulic mines of this district, was worked for a number of years by Chinese. The formation consists of a soft talcose slate, intercalated with stringers of quartz, which in places concentrate and form a well defined quartz vein, rich in gold, the deposit being known as ''seam diggings.'' The quartz prospects are worked in a very limited way. The Grey Eagle copper mine is the only developed property in the district.

GOLD MINES—QUARTZ.

Advance, in Sec. 17, T. 40 N., R. 10 W., in the Liberty mining district, 13½ miles southeast of Etna Mills, in the Klamath Reserve. Owners, Advance Mining Company, of Denver; president, H. E. Wood; watchman, C. Ritz. Comprises 100 acres, patented, on Cow Creek. Short ore shoots in dioritic schist and limestone; 400-foot tunnel, drifts and stopes. Equipment consists of 1500-foot tramway, dwellings, and 5-stamp mill, driven by waterpower (water from Russian Creek, through 2 miles of flume). Idle for several years. Ore low grade and free milling. Hardscrabble prospect to the south.

Bailey, in Sec. 35, T. 46 N., R. 9 W., in the Deadwood mining district, 7 miles northwest of Fort Jones, at an elevation of 5000 feet. Owner, L. Bailey. Comprises 80 acres on Indian Creek. Short ore-shoot, in diabase. Worked for pockets. Some rich ore on the surface. Small producer. Idle at present.

Bibl.: Report VIII, p. 624.

Baker, in Sec. 15, T. 44 N., R. 9 W., in the Deadwood mining district, 7½ miles north of Fort Jones, at an elevation of 5000 feet. Owner, George Baker. Comprises 60 acres on Indian Creek. Short ore-shoot in slate. Worked for pockets. 300-feet tunnel. Old 5-stamp mill, driven by waterpower. Small producer.

Bibl.: Report, VIII, p. 625.

Bender, in Sec. 18, T. 42 N., R. 11 W., in the Liberty mining district, 4 miles north of Etna Mills, in the Klamath Reserve. Owner, A. A. Chamberlain. Comprises 40 acres, at an elevation of 3300 feet. Short ore-shoot in limestone and diorite. 340-foot tunnel and 250 feet of drifts. One 3½-foot Huntington mill, in poor condition. Some rich specimens found near the surface. Idle at present.

Ben Neil, in Sec. 10, T. 44 N., R. 9 W., in the Deadwood mining district, 11 miles northwest of Fort Jones at an elevation of 7100 feet. Owner, B. Neil. Comprises 40 acres. Short ore shoot in diorite; 100-foot tunnel. Small pockets taken out. Idle.

Big Ledge, formerly known as the *Lewis,* in Sec. 8, T. 43 N., R. 9 W., in the Oro Fino mining distrcit, 6 miles northeast of Greenview. Owner, G. Lewis. Comprises 20 acres. Pockets in diabase. One ore-shoot is 100 feet long and 15 inches wide; 360-foot tunnel. Only do assessment work. Idle.

Bibl.: Report XII. p. 277; XIII, p. 388.

Black Bear, discovered in 1860, is the most noted and largest quartz producer in Siskiyou County. It is in Sec. 13, T. 39 N., R. 12 W., in the Liberty mining district; 9 miles south of Sawyer's Bar in the Klamath Reserve. Owners, Black Bear Consolidated Mining Company, of Rollin; John Daggett, president; leased to Rollin Mining Company of San Francisco; J. L. Dunscomb, president; W. A. Farish, Jr., superintendent. The ore bodies occur in lenticular shaped deposits, which pinch out at times on the footwall side. The holdings comprise 70 acres of patented ground, consisting of the Black Bear, South Black Bear and Yellow Jacket claims, with 10 acres for millsite; workings consist of tunnels and two shafts; altitude, 3600 feet; water supply from Black Bear and Auges Creek, through two flumes, each 1 mile long, and

1600 feet of pipe; length along lode, 4500 feet; length of ore shoot, 150 feet; width of ore shoot, 3 feet; footwall, slate; hanging-wall, slate; number veins, two.

Black Bear and east and west crossing at right angles; character of ore, free milling; strike, north and south; dip, 40° E.; greatest vertical depth below outcrop, 600 feet; length driven on vein, 1500 feet; workings, six tunnels from 100 to 700 feet long; old shaft 550 feet deep (six levels); new shaft on Black Bear claim is 475 feet deep (size 10′ x 4′), sunk at an angle of 45° (3 levels); 4000 feet of drifts from old shaft, all to the west, several crosscuts; raise 3′ x 5′ x 30′, in new shaft from third level (200 feet); old stopes all filled; source of power, water and electricity; mine equipment, hoist, cars, compressor plant, compressor pump, tools, shops, assay office, dwellings, and 100 h.p. electric plant with 2 miles of power line; reduction equipment, 16 stamp mill, electrically driven (stamps weigh 650 pounds); number men employed, top 7, mine 2, total 9; cost (per ton): development, $2.00, mining $1.50, treatment $0.80, general $0.60; production to date, $3,100,000.

White Bear prospect to the north. From 1872 to 1881 the Black Bear mine paid $1,000,000 in dividends; most of the work performed on Black Bear claim; good wagon road from Sawyer's Bar to the mine.

Bibl.: Report VIII, pp. 620, 621; X, p. 656; XIII, p. 389.

Black Hawk, in Sec. 31, T. 46 N., R. 7 W., in Virginia Bar mining district; 5 miles north of Gottville in Klamath Reserve. Owners, Ladd & Ogden. Comprises 40 acres; formation granite and schist; ore found in small pockets; 100 foot tunnel; only do assessment work.

Blind Lode, in Sec. 18, T. 43 N., R. 9 W., in the Oro Fino mining district; 5½ miles northeast of Greenview. Owner, H. J. Diggles; comprises 20 acres of patented land, located in 1876; 150-foot ore shoot, 6 inches wide in diabase; four tunnels, longest being 600 feet; some rich ore extracted; said to have produced $40,000. Idle.

Bibl.: Report, XII, p. 278; XIII, p. 390.

Blue Jay, in Sec. 11, T. 47 N., R. 8 W., in Virginia Bar mining district; 5½ miles north of Gottville in Klamath Reserve. Owners, Blue Jay Mining Company; president, Mrs. P. D. Bennell; secretary, P. Billings; home office, Cleveland, Ohio; comprise 160 acres of patented land, purchased from Southern Pacific Railroad Company; formation, schist and diorite; one vein 150 feet long and 5 feet wide; low grade; two tunnels, 250 and 400 feet long; 10-stamp mill built by Union Iron Works; 1000-pound stamps; two Johnson concentrators; water power and steam; 2½ mile ditch from North Fork of Empire Creek; small production. Idle since 1907.

Blue Lead, in Sec. 26, T. 42 N., R. 9 W., in the Liberty mining district, 5 miles southeast of Etna Mills in the Klamath Reserve. Owner, L. H. Cory; comprises 40 acres of patented land; short ore shoot in diabase; rich on the surface; 580-foot tunnel, old 80-foot shaft and drifts comprise several hundred feet of development work; old 4-stamp mill (650-pound stamp); said to have produced $40,000. Idle since 1908.

Bonanza, in Sec. 14, T. 46 N., R. 7 W., in Cottonwood mining district; 10 miles southwest of Hornbrook in Klamath Reserve. Owners, Klondike Mining and Milling Company; president, J. P. Kleprock; secretary, L. P. Kleprock; home office, Long Beach; discovered in 1883 by C. Dovey; formation hornblende schist and granodiorite; short ore shoot; pocket mine; 1600-foot tunnel; equipment, dwellings and 5-foot Huntington mill; locator took out $10,000 in a pocket. Idle.

Boyle, in Sec. 8, T. 45 N., R. 8 W., in the Humbug mining district; 14 miles west of Yreka in the Klamath Reserve. Owner, C. E. Bunker; 100 acres located in 1880; two parallel veins, strike N. 40° W., and dip 60° S.; ore shoot is 200 feet long and 2 feet wide; formation is slate; five tunnels from 40 to 900 feet in length; only do assessment work. Idle.

Bibl.: Report XII, p. 278; XIII, p. 390.

Brown Bear, formerly known as *Golden* and *Eveleth's,* in Sec. 2, T. 39 N., R. 11 W., in the Liberty mining district; 3 miles southeast of Sawyer's Bar in the Klamath Reserve. Owners, Swain and Cleaver; comprises 100 acres on White's Gulch at an elevation of 3100 feet; 160-foot ore shoot, 18 inches wide, with a course of N. 20° E. and dip of 25° E.; 480-foot tunnel, drifts and stope; 4-stamp mill, driven by water power, from White's Gulch through 1½ miles of ditch and ½ mile of flume. Idle at present; has been a producer.

Bibl.: Report XII, p. 283; XIII, p. 402.

California Consolidated, formerly known as the *Golden Ball mine,* in Secs. 16 and 17, T. 39 N., R. 11 W., in the Liberty mining district; 3½ miles southwest of Sawyer's Bar in the Klamath Reserve. It is owned by the California Consolidated Mining Company; W. H. Young, of Oakland, president; Geo. Ball, superintendent; comprises 384 acres, 17 being patented; has been a producer and some ore still in sight, but no system of mining was pursued, so that much useless work was performed; altitude, 3800 to 4700 feet; fissure vein; length of ore shoot 1000 feet; width 6 feet; free milling; strike N. 20° to 40° E., dip 10° to 40° SE.; footwall, slate (soft); hanging-wall, slate; greatest vertical depth below outcrop, 600 feet; length driven on vein, 1000 feet; two levels, one at 50 and other at 125 feet; drifts, 160 feet, from 50-foot level, and 80 feet from 125-foot level; another from Stevens tunnel is 140 feet northeast and another 250 feet southwest; two crosscuts, 120 feet long; two winzes, each 60 feet deep; seven raises; two stopes in Stevens tunnel, each being 40 feet by 40 feet; several open cuts; equipment, 25 h.p. compressor, small hoist, 150 h.p. electrical plant (on North Fork of Salmon River at Sawyer's Bar) with 3 miles of power line, 1500-foot tramway, dwellings, and 20-stamp mill driven by electricity. Idle. Production to date is $473,500; idle since 1910; only assessment work being done; property should be a dividend payer if properly managed; said to be a continuation of the Black Bear lode.

Bibl.: Report XII, p. 282; XIII, p. 402.

Cape Cod, in Secs. 18 and 19, T. 45 N., R. 7 W., in Greenhorn mining district; 6 miles west of Yreka, in the Klamath Forest Reserve. Owners, Le May & Bulis; consists of 115 acres (40 acres patented); located in 1885; formation, slate and porphyry; two parallel veins, shoot 300 feet long and 14 inches wide; 300-foot tunnel; produced $12,000. Idle.

Central, in Sec. 34, T. 48 N., R. 8 W., in Hungry Creek mining district, 16 miles northwest of Hornbrook. Owners, Coil and Haslett. Located in 1893, 20 acres. Short ore shoots; ledge 2 feet wide; two tunnels, one 400 feet long; formation, granite and schist; free milling. Idle.

Champion, in Sec. 32, T. 12 N., R. 6 E., 10½ miles from Orleans, in the Cottage Grove mining district in Klamath Reserve. Owners, J. A. Hunter et al.; 180 acres, located in 1899; two veins, in porphyry; still in ore in workings; equipment, dwellings and one stamp mill (800-pound stamp) driven by water power, and 2-ton cyanide plant; water from Ten Eyck Creek through 2000 feet of ditch; claims are on the east slope of Prospect Hill; owner claims to have 14,000 tons of $15 rock in sight; three men employed; adjoins Twan & Hannan prospect.

Cherry Hill, in Sec. 25, T. 45 N., R. 8 W., in the Greenhorn mining district; 6½ miles southwest of Yreka in Klamath Reserve. Owner, Incorporated Company; several tunnels, longest being 200 feet; formation is diorite and porphyry; old 3-stamp mill, driven by steam power; adjoins Mt. Vernon on the west; been idle for a number of years; small production record.

Columbia, in Sec. 16, T. 45 N., R. 9 W., in the Scott River mining district, 7 miles northeast of Scott Bar in the Klamath Reserve; elevation of 4700 feet. Owner, Scott River Mining Company, of Seattle; C. F. Lee, president; comprises 40 acres, on Old Baldy Mountain; located in 1882; short ore shoot in slate and diabase; workings consist of 700-foot tunnel and 120-foot shaft; ore is free milling near the surface, but base with depth; equipment consists of dwellings and 10-stamp mill driven by steam and water power; only do assessment work; said to have been a producer at one time.

Bibl.: Report XII, p. 280; XIII, p. 394.

Condensed, in Sec. 12, T. 38 N., R. 11 W., in the Liberty mining district; 15 miles southeast of Sawyer's Bar in the Klamath Reserve. Owner, W. H. Cady; comprises 60 acres at an elevation of 2400 feet; short ore shoot in granite; little high grade found on footwall side; 220-foot tunnel. Idle.

Connor, in Sec. 18, T. 43 N., R. 9 W., in the Oro Fino mining district; 5 miles northeast of Greenview. Owner, J. Connor; comprises 20 acres short ore shoot; pay in pockets; 500-foot tunnel; said to have produced $15,000. Idle.

Bibl.: Report XIII, p. 395.

Crawley, in Sec. 22, T. 40 N., R. 8 W., in the Callahan mining district, 1½ miles southwest of Callahan in the Klamath Reserve. Owner, C. A. Warden Estate; comprises 60 acres; short ore shoots; pay ore occurring in pockets; in hornblende schist; 600-foot tunnel and 500 feet of drifts, 30-foot stope; old 2-stamp mill, 650-pound stamps; said to have produced $60,000; only do assessment work.

Bibl.: Report XIII, p. 396.

Cub Bear and Blue Jeans, in Sec. 9, T. 40 N., R. 10 W., in the Liberty mining district, 12 miles southeast of Etna Mills in the Klamath Reserve. Owners, Siskiyou Syndicate, of Los Angeles; president, I. J. Luce; secretary, M. Marx; superintendent, C. Ritz; comprises 100 acres; elevation 5800 feet; veins, two in number, occur in hornblende schist and quartz-porphyry; three short tunnels and open cuts, and ore being removed from the latter at present; good prospect; 80 tons milled, which gave returns of over $20 per ton; five men are employed on the Highland lode; discovered in 1898 by Chas. Cory.

Cummings, formerly known as the *McKeen,* in Sec. 36, T. 40 N., R. 9 W., in the Callahan mining district, 3½ miles southwest of Callahan in the Klamath Reserve; has been one of the best quartz producers in this district. It is owned by the Shasta Mining Company, of Callahan, with James McKeen as manager-superintendent, and comprises 200 acres, patented, on Wildcat Creek at an elevation of 4200 feet; strike of the vein is N. 40° E., dip 40° SW.; ore shoots are short, being 130 feet long and 3 feet wide, all in granite; main tunnel is 800 feet long and, together with the drifts, crosscuts and stopes, comprise several thousand feet of work, but no depth has been attained; old Kinkead mill (driven by water power) and a dwelling, on the property; has been a good producer, said to exceed $500,000, and ore is free and easily worked; idle at present; has been worked since 1874.

Bibl.: Report XII, p. 280; XIII, p. 396.

Dewey, one of the noted quartz mines of Siskiyou County, is located in Sec. 23, T. 42 N., R. 8 W., in the Gazelle mining district; 12 miles southwest of Gazelle in the Klamath Reserve. It is owned by the Squaw Mining Company and comprises 100 acres, patented, at an elevation of 6800 feet; the strike of the vein is N. 40° E., dip 30° SE. The ore occurs in granodiorite, having a width of 3 feet; workings consist of a shaft 400 feet deep, a tunnel 920 feet in length, drifts, raises and stopes, all comprising several thousand feet of development work; equipment consists of hoist, dwellings, and old 10-stamp and Huntington mills (poor condition) operated by steam and water power; property said to have produced $900,000; discovered in the early eighties; idle since 1907.

Double Eagle and Little Quartz, in Sec. 26, T. 46 N., R. 9 W., in Oak Bar mining district in Klamath Reserve, 30 miles west of Hornbrook. Owner, H. H. Barton; comprises 20 acres; pocket mine; ore is hornblende schist and granitic-porphyry; 120-foot tunnel; produced $10,000, ore being crushed in an arrastra. Idle.

Bibl.: Report XIII, p. 397.

Eliza, in Secs. 4 and 9, T. 45 N., R. 8 W., in the Humbug mining district, 15 miles west of Yreka in the Klamath Reserve. Owners, Shur, Yunker & DeWitt, of Yreka. Group comprises 100 acres, located in 1865 by D. M. Lash; relocated in 1892 by present owners. Elevation is 4500 feet. There is a good wagon road from the property to Yreka. The location covers the lode for a distance of 4500 feet. The fissure vein occurs in quartz-porphyry and diabase, the former being the footwall and the latter the hanging-wall. The strike is N. 20° E. and dip 45° E.; ore shoot is 200 feet long and 5 feet wide; a 1400-foot tunnel has been driven on the vein, giving 360 feet of backs; above this lower tunnel there are four others from 100 to 800 feet in length; there are five stopes in all; equipment consists of dwellings and 10-stamp mill. Owners claim an ore reserve of 40,000 tons of value of $5 per ton and a production to date of $150,000; two men are employed doing development work in the lower tunnel; ore free near surface, but somewhat base with depth.

Elk Creek, in Sec. 3, T. 45 N., R. 7 W., in Hawkinsville mining district, 6 miles north of Yreka. Owners, Elk Creek Mining Company; president, L. F. Colburn; secretary, J. E. Harmon; home office, Yreka;

100 acres located in 1903, in Klamath Reserve; three parallel veins; 100-foot ore shoot 14 inches wide; formation, slate and porphyry; two tunnels 600 and 450 feet long; 10-stamp mill driven by electricity; production $20,000. Idle.

Fagundez (see *Humpback*).

Fleetwood and Nannie S., formerly known as *Old Jackson,* in Sec. 5, T. 45 N., R. 8 W., in the Humbug mining district, 16 miles west of Yreka. Owner, L. W. Cousins; comprises 80 acres; short ore shoots in granitic-porphyry; seven tunnels from 5 to 800 feet in length. Idle; only do assessment work.

Franklin, in Sec. 16, T. 44 N., R. 9 W., in the Deadwood mining district, 8 miles north of Fort Jones at an elevation of 5500 feet. Owners, Miller & Arnold; comprises 40 acres on Indian Creek; ore shoot is 120 feet long and 22 inches wide, with slate footwall and quartz-porphyry hanging-wall; 600-foot tunnel, drifts and 60-foot stope; claim production of $90,000; ore runs about $25 per ton and is worked in Baker's mill; leased to Wells & Brown. Idle since July, 1913; 20 tons of $25 rock on the dump.

Golden Eagle, formerly known as the *Sheba,* in Sec. 7, T. 44 N., R. 9 W., in the Deadwood mining district; 10 miles north of Fort Jones; was one of the producers in this section. It is owned by the Indian Creek Mining Company of San Francisco; president, I. J. Coe, and superintendent, T. E. Morrison; comprises 80 acres, patented; ore shoots are 200 feet long and 15 inches wide, with diabase footwall and quartz-porphyry hanging-wall; 750-foot tunnel, drifts and stopes, making several thousand feet of development work; the equipment, consisting of 50 h.p. boiler and 5-stamp mill, have been removed from the property and company has closed down and practically abandoned the buildings; has paid some dividends.

Bibl.: Report VIII, p. 625.

Golden Seal, in Sec. 18, T. 43 N., R. 9 W., in the Oro Fino mining district, 5 miles northeast of Greenview at an elevation of 3200 feet. Owner, V. Pitz; comprises 20 acres, located in 1885; 300-foot ore shoot, 8 inches wide, in syenite and quartz-porphyry; 525-foot tunnel on the vein; a few pockets of high grade taken out. Owner works the claim in the winter.

Golden West, formerly known as the *King,* in Sec. 15, T. 39 N., R. 10 W., in the Salmon River mining district, 13 miles west of Callahan, in the Klamath Reserve. Owner, J. S. Baggs; comprises 60 acres on Trail Creek at an elevation of 7000 feet; fissure vein, in schist; 200-foot tunnel, still in ore; one man is employed; good prospect, with well-defined ledge of free milling ore, 4 feet wide and running from $8 to $15 per ton; discovered in 1904.

Gold Hill, formerly known as the *Gilta,* in Sec. 12, T. 9 N., R. 7 E., in the Liberty mining district, in Klamath Reserve, at an elevation of 3500 feet. Owner, E. A. Dannenbrink; comprises 60 acres of patented land; ore shoot is 250 feet long and 3 feet wide, in slate and diorite; several thousand feet development work, consisting of tunnels, crosscuts and stopes; equipment consists of dwellings, and 10-stamp mill operated by steam and water power, idle at present; twelve men employed, doing prospect work; property has been a producer.

Grizzly Gulch, in Sec. 14, T. 44 N., R. 9 W., in the Deadwood mining district, 10 miles north of Fort Jones at an elevation of 7000 feet. Owner, J. Shelly; comprises 60 acres; short ore shoots in diabase; worked for pockets; said to have produced $4000 from 80-foot tunnel. Idle.

Gumboat, in Sec. 15, T. 45 N., R. 9 W., 8 miles east of Scott Bar, in the Scott River mining district in the Klamath Reserve. Owner, A. Simon; comprises 40 acres; ore is base with depth (some chalcopyrite), occurring in slate; length of ore shoot not determined; 120-foot tunnel; 60-foot shaft; only do assessment work.

Bibl.: Report XIII, p. 404.

Hansen, formerly known as *Knownothing Creek,* in Secs. 1 and 12, T. 9 N., R. 7 E., in the Liberty mining district, 8½ miles southwest of Forks of Salmon, in Klamath Reserve. Owners, Roberts & Hagland; comprises 60 acres of patented land, located in 1880; short ore shoot, in slate and quartz-porphyry; several tunnels, longest being 850 feet, equipment, dwelling and old arrastra; two men employed doing prospect work; has been a small producer.

Bibl.: Report VIII, p. 622.

Hardscrabble, in Sec. 17, T. 40 N., R. 10 W., in the Liberty mining district, 14 miles southeast of Etna Mills in the Klamath Reserve. Owner, Hardscrabble Mining Company, of Los Angeles; C. B. Parrott, president; John Nefroney, superintendent; comprises 140 acres, at an elevation of 6100 feet; length of ore shoot not determined; country rock in dioritic-schist; 400-foot tunnel; two men employed. Highland Mine to the northeast.

Hazel, in Sec. 25, T. 47 N., R. 8 W., in the Cottonwood mining district, 4 miles southwest of Hornbrook, is the only large producer in this district. It is owned by the Hazel Gold Mining Company, of Chico; J. A. Jillson, president, and J. W. Roper, secretary. The group comprises 80 acres of patented land in the Klamath National Forest Reserve at an elevation of 2800 feet. There are three veins, known as the Potato Patch, "C" and Hazilett, which occur in the slate, the last two being practically parallel. The ore shoot is 150 feet long and 3 feet in width, with a 40° dip to the south. There are five tunnels from 100 to 1500 feet in length, all in the vein, comprising, with the drifts and stopes, several thousand feet of development work. The equipment consists of dwellings, assay office, and a 10-stamp Hendy mill (850-pound stamps) driven by waterpower from Ditch Creek through 1 mile of ditch. The property is said to have produced $800,000, but is idle at the present time. It was discovered in 1883 by H. Hazilett and then sold to the present owners.

Hicks, formerly known as *China Gulch.* In Sec. 2, T. 46 N., R. 7 W., 7 miles northwest of Hornbrook in the Klamath Reserve. Owner, J. T. Hicks. Comprises 40 acres. Ore shoot said to be 600 feet long, but only 3 inches wide on the surface, occurring in granite. Surface stripped of overburden and ore exposed a few feet below, which was crushed in an arrastra; 150-foot tunnel; 8-foot arrastra, run by water power; tailings impounded (150 tons on hand), which are to be treated in cyanide plant soon; said to assay from $5 to $15 per ton. Idle at present. Small producer.

Highland, in Sec. 16, T. 40 N., R. 10 W., in the Liberty mining district, 11 miles southeast of Etna Mills in the Klamath Reserve, is one of the noted quartz mines of this county. It is owned by the Belgium-Bohemian Mining Company, of Belgium. H. E. Mattern, superintendent. Comprises 100 acres at an elevation of 6400 feet. Supplies are brought over a 3-mile trail by means of pack animals; ore shoots are about 130 feet long and 2 feet wide, having a strike of N. 40° E and a dip of 30° SE.; footwall is dioritic-schist and hanging-wall is quartz-porphyry; workings consist of tunnels, the main tunnel having a length of 600 feet; there are several thousand feet of development work, all near the apex of the mountain, so that only a shallow depth has been obtained; equipment consists of cars, mining tools, assay office, dwellings, and a 10-stamp mill (modern pattern) run by gasoline; twenty-six men are employed; said to have produced over $350,000; best ore found in pockets; discovered in 1899 by P. Musick, who extracted $80,000 from pockets.

Highland, known also as the *Old Highland.* In Sec. 12, T. 39 N., R. 10 W., in the Salmon River mining district, 12½ miles northwest of Callahan in the Klamath Reserve. Owners, Denny-Bar Company. Comprises 60 acres on Trail Creek; fissure vein between walls of granite and schist, being an extension of the Trail Creek ledge; 200-foot tunnel, and 400 feet of drifts; ore is free and easily worked; idle at present; owners only do assessment work; Trail Creek prospect to the south.

Bibl.: Report XIII, p. 405.

Highland, in Sec. 25, T. 46 N., R. 7 W., in the Cottonwood mining district, 3 miles west of Hornbrook in the Klamath Reserve. Owner,

C. A. Myers. Comprises 60 acres; ore shoot is 125 feet long and 10 inches wide, being free milling and high grade; formation is slate; 1500-foot tunnel on the vein; idle at present; discovered in 1903 by Donnelly Bros.; then abandoned and relocated by Rogers, who abandoned it, and was relocated by present owner; small producer.

Hoboken, in Sec. 21, T. 45 N., R. 8 W., in the Deadwood mining district, 11 miles north of Fort Jones. Owner, T. A. Walker. Comprises 40 acres, patented, on Cherry Creek; 120-foot ore shoot, 10 inches wide, with diabase foot and slate hanging-walls; 600-foot tunnel and 250-foot drift; small producer at one time, the ore being crushed in an arrastra; idle since 1907.

Bibl.: Report XII, p. 284; XIII, p. 406.

Homestake, in Sec. 15, T. 40 N., R. 10 W., in the Klamath Reserve. Owners, Taylor & Bobs; J. F. Boyle, superintendent. Comprises 120 acres on the same lode as the Highland mine; formation is quartz-porphyry and dioritic schist; worked by means of tunnels; high grade (pocket) gold extracted, which has made the property noted; discovered in 1902; elevation is 6100 feet; eight men are employed; has produced several thousand dollars in high grade; 2-mile trail from wagon road.

Humpback, formerly known as *Fagundez,* in Secs. 4, 5, 8 and 9, T. 39 N., R. 11 W., in the Liberty mining district; 3 miles south of Sawyer's Bar in the Klamath Reserve. Comprises 80 acres of patented land on Eddy's Gulch; elevation 3400 feet; length along lode 6000 feet; ore shoot is 80 to 100 feet long and 1 foot wide; strike N. 20° E., dip 25° NE.; formation is slate; workings consist of 250-foot tunnel, drifts and crosscuts; small producer; idle for several years.

Bibl.: Report VIII, p. 619.

Inyo, in Sec. 2, T. 45 N., R. 8 W., in the Humbug mining district, 11 miles west of Yreka in Klamath Reserve at an elevation of 3100 feet. Owner, J. D. Fairchild. Comprises 20 acres, discovered in 1909; short ore shoots in quartz-porphyry pocket mine; produced $4000. Idle. Only do assessment work.

Ironsides, formerly known as *Little Wonder,* in Sec. 26, T. 45 N., R. 8 W., in Greenhorn mining district, 7 miles southwest of Yreka, in Klamath Reserve. Owner, James Ironsides; worked as a pocket mine; three short tunnels; small producer of high grade ore.

Bibl.: Report XII, p. 285; XIII, p. 408.

Johnson and China Paul, in Sec. 12, T. 43 N., R. 10 W., in Quartz Valley mining district, 7 miles north of Greenview. Owner, S. H. Holgate. Comprises 80 acres; 200-foot ore shoot, 10 inches wide, in diabase;

680-foot tunnel; some rich pockets extracted from Johnson claim; idle since 1910.

Bibl.: Report VIII, p. 626.

Kangaroo, in Sec. 29, T. 40 N., R. 7 W., in the Callahan mining district, 9 miles southeast of Callahan in the Klamath Reserve. Owner, C. O. Johnson. Comprises 60 acres; short ore shoot, in diorite and granitic-porphyry, 220-foot tunnel and 400 feet of drifts; worked for pockets; some high grade ore extracted.

Katie May, in Sec. 24, T. 45 N., R. 8 W., in the Greenhorn mining district, 6 miles west of Yreka in Klamath Reserve. Owner, A. S. Calkins; comprises 20 acres; located in 1886; relocated in 1900; short ore shoots in diorite and slate; 250-foot tunnel and 80-foot shaft; one stope, 60 feet by 4 feet by 50 feet; ore in sight consists of 100 tons, valued at $14 per ton; only do assessment work.

Bibl.: Report XIII, p. 409.

King Solomon, in Secs. 6 and 7, T. 38 N., R. 11 W., in the Liberty mining district, 12 miles southeast of Sawyer's Bar in the Klamath Reserve, is another of the quartz producers of Siskiyou County. It is owned by C. B. Cottrell, of Westerly, R. I.; W. H. Young, superintendent, and comprises 40 acres located in the eighties by P. Dannenbrink; length along lode 3000 feet; length of ore shoot, 230 feet; width 5 feet; strike north and south; dip 60° E.; footwall, quartz-porphyry; hanging-wall slate; ore free milling; workings: 130-foot shaft, tunnels, longest being 460 feet, over 1000 feet of drifts, crosscuts and stopes, making in all several hundred feet of development work; equipment; cars, 30 h.p. boiler, small hoist, dwellings and an 8-stamp mill; has been a good producer and pay ore in sight; five men employed at present; mine being opened up so as to have a considerable tonnage blocked out.

Little Bonsa, in Sec. 9, T. 45 N., R. 7 W., in Hawkinsville mining district, 4½ miles north of Yreka. Owner, C. N. Gordon; in Klamath Reserve; 20 acres, located in 1910; short ore shoot, 6 inches wide; two tunnels, longest 40 feet; idle since 1912.

Lucky Strike, in Sec. 33, T. 41 N., R. 10 W., in the Liberty mining district, 9 miles southeast of Etna Mills in the Klamath Reserve. Owners, Lucky Strike Mining Company, of Los Angeles; president, T. Eagerly; superintendent, W. F. Smith. Comprises 80 acres; short ore shoot in hornblende schist; 450-foot tunnel; some high grade ore found near the surface; two men employed.

Lucky Strike, in Sec. 28, T. 45 N., R. 7 W., in Greenhorn mining district, 1½ miles northwest of Yreka. Owner, F. M. Osgood; superintendent, J. M. Beale; 160 acres, located in 1865; formation, slate; doing development work; 1000 tons of ore in sight; four tunnels and one 80-foot shaft; nine men employed. Some ore treated in custom mill at Yreka.

Marrian & Goodale, in Sec. 15, T. 40 N., R. 10 W., in the Liberty mining district, 9½ miles southeast of Etna Mills in the Klamath Reserve. Owner, Incorporated Company, of San Francisco; James Hogan, manager; comprises 80 acres, located in 1903; short ore shoot, in hornblende schist; 480-foot tunnel; rich bunches of high grade found; 2-stamp mill driven by steam power; dwellings; has been a small producer; idle at present.

McClaughry Group, in Sec. 8, T. 45 N., R. 8 W., in the Humbug mining district, 14 miles northwest of Yreka in Klamath Reserve. Owner, C. Humphreys; comprises 80 acres; formation is dolomite; 160-foot ore shoot, 2 feet wide; free milling; 600-foot tunnel; ore reserve consists of 1500 tons, assaying $20 per ton. Idle.

Monarch, in Sec. 8, T. 39 N., R. 11 W., in the Liberty mining district. Owner, G. R. Godfrey; comprises 40 acres, on Eddy Creek, at an elevation of 3300 feet; pocket mine; 150-foot tunnel; pockets occur in slate; only do assessment work.

Morrison & Carlock, formerly known as the *Little Queen,* is located in the Quartz Valley mining district, in Sec. 13, T. 43 N., R. 10 W., 4 miles northwest of Greenview, and comprises 60 acres of patented land. It is owned by the Richman Company of Fort Jones and has a production record of $500,000. Idle since 1907 on account of lawsuits. Altitude, 2800 feet; course of vein, N. 20° E, dip 45° E.; vertical depth 400 feet (shaft, size 5′ x 7′); number of levels, eight; 1200-foot drift to the west on this level; walls, limestone and quartz-porphyry; length of ore shoot, 350 feet; width 16 inches; 1500-foot tunnel on vein; character of ore, brittle smoky quartz, free milling; mine equipment: 35 h.p. steam hoist, Gould water pump, cages, dwellings, assay office; reduction equipment: 10-stamp mill built by Union Iron Works, operated by electricity.

Mount Vernon, in Sec. 25, T. 45 N., R. 8 W., in the Greenhorn mining district; 6 miles southwest of Yreka in Klamath Reserve. Owner, Incorporated Eastern Company; ore shoots are 150 feet long and 2 feet wide, occurring in slate; strike N. 40° E.; dip 50° S.; three tunnels, longest being 1200 feet on the vein; equipment; dwellings, assay office and 10-stamp mill driven by electricity, power being obtained by California-Oregon Power Company; has been a producer; worked at times by leasers; idle at present.

Nigger Boy, in Sec. 2, T. 46 N., R. 7 W., in the Cottonwood mining district, 5 miles southwest of Hornbrook in the Klamath Reserve. Owner, W. H. Allison; comprises 60 acres, located in 1898; formation is slate and diorite; ore shoot is 180 feet long and 2 feet wide; two tunnels, 1000 and 80 feet long on vein; equipment: dwellings, mining tools, blacksmith shop, 2-stamp mill driven by steam and water power; 1½ mile ditch from Ash Creek; under bond to Commercial Copper and Gold Mining Company, of Tallant, Oregon; three men are employed; some production, and ore reserves, claimed.

Ohio Group, in Sec. 8, T. 46 N., R. 6 W., in Fool's Paradise mining district; 7 miles south of Hornbrook. Owner, W. Seeman; 60 acres, patented, located in 1903; formation, syenite and diorite; base ore; 300-foot oreshoot, 1 foot wide; 500-feet tunnel. Idle.

Old Indian, in Sec. 4, T. 9 N., R. 8 E., in Liberty mining district; 9 miles southwest of Forks of Salmon, in Klamath Reserve. Owner, A. Nally; comprises 40 acres, located in 1892; short ore shoot in serpentine; 200-foot tunnel; old 120-foot shaft (caved); worked as a pocket mine; only do assessment work.

Old Vet and Eclipse, in Secs. 10 and 11, T. 45 N., R. 8 W., in the Humbug mining district, 10 miles northwest of Yreka in Klamath Reserve at an elevation of 3900 feet. Owner, J. P. Horn; comprises 40 acres; two parallel veins in granite; three tunnels, longest being 100 feet; few tons of ore milled, gave returns of $14 on plates.

Bibl.: Report XIII, p. 418.

Oregonian Group, formerly known as the *Malloy,* in Secs. 15, 16, 21 and 22, T. 40 N., R. 11 W., in the Liberty mining district; 3 miles northeast of Sawyer's Bar in the Klamath Reserve. Owner, D. Malloy; comprises 60 acres, located in 1886; 160-foot ore shoot 5 feet wide, strike N. 30° E., dip 40° NE.; strong ledge in granite; 420-foot tunnel; only do assessment work.

Bibl.: Report XII, p. 289; XIII, p. 419.

Oro Grande, in Secs. 10 and 11, T. 45 N., R. 7 W., in the Humbug mining district, 12 miles northwest of Yreka in the Klamath Reserve. Owners, Trask & Corinson; comprises 100 acres, located in 1860 and relocated in 1892 by present owners; four parallel veins, having dolomite foot and porphyry hanging-walls; 300-foot ore shoot, 2 feet wide; 300-foot tunnel and 160-foot shaft; one stope 80 feet by 4 feet by 40 feet; 10-foot arrastra run by water from Humbug Creek; owners claim ore reserve of 1000 tons, value $16; produced to date $20,000; some of the ore pans $40 per ton; owners do all the work.

Bibl.: Report, XIII, p. 419.

Overton, in Sec. 16, T. 40 N., R. 10 W., in the Liberty mining district; 13 miles southeast of Etna Mills in the Klamath Reserve. Owners, Overton Gold Mining Company; C. E. Overton, president;

L. E. Buckner, superintendent; comprises 80 acres; ore shoots are 100 feet long and 20 inches wide, in dioritic schist; 420-foot tunnel, drifts and stope; 120 tons of ore on the dump, which is carried on mules to the Advance mill, a distance of 2 miles (5 mules handle 1 ton each trip, or 8 tons per day); property is idle at present; small producer.

Pilot Knob, in Secs. 23, 24 and 26, T. 47 N., R. 7 W., in the Virginia Bar mining district, 3 miles north of Gottville in Klamath Reserve. Owners, Pilot Knob Mining Company; president, W. D. Wall; secretary and superintendent, T. K. Anderson; home office, Gottville; comprises 310 acres; formation, hornblende schist; three veins; length and width of ore body not determined; crosscut tunnel 340 feet long, not in ore as yet; several small tunnels in ore; ore is free milling and runs $20 per ton; equipment consists of assay office, several dwellings, 600 feet of aerial tramway; 5-stamp Risdon Iron Works mill (850-pound stamps) run by water power; two men employed; last ore milled gave returns of $18 per ton from 16 tons; located in 1882.

Prospect Hill, in Sec. 30, T. 12 N., R. 6 E., 11 miles from Orleans in the Cottage Grove mining district in Klamath Reserve. Owners, C. S. Little; several small tunnels in porphyry; free milling, 3-stamp mill; small production.

Providence, in Sec. 18, T. 43 N., R. 9 W., in the Oro Fino mining district, 5 miles northeast of Greenview. Owners, Kradel Brothers; comprises 40 acres; short ore shoot in diabase; worked for pockets; 650-foot tunnel; small producer. Idle; only do assessment work.

Bibl.: Report XIII, p. 421.

Quartz Hill, in Sec. 16, T. 45 N., R. 10 W., in the Scott River mining district, ⅛ mile south of Scott Bar on Scott River in Klamath Reserve. Owner, H. G. Noonan, of San Francisco; comprises 45 acres of patented land on Quartz Hill, located in 1862; ore occurs in slate, and has been worked both as a quartz and hydraulic mine, the surface having been worked as a placer deposit at one time; water is obtained from Mill Creek through two ditches, one 6 miles and the other 5 miles in length; the strike is northeast and southwest; the bedrock, so-called, consists of alternate beds of slate and quartzite, enclosed by two parallel dikes, 1800 feet apart. The whole mass is crushed by these dikes of quartzite; practically only the surface has been worked; yearly production is from $10,000 to $12,000; equipment consists of old 10-stamp mill, two giants, and 1500 feet of pipe; some rich pockets found in the quartz seams. Idle at present.

Bibl.: Report XII, p. 290; XIII, p. 421.

Red Hill, in Sec. 4, T. 45 N., R. 7 W., in the Hawkinsville mining district; 5 miles north of Yreka. Owner, J. Phillips; in Klamath

Reserve; 13-inch vein; free milling; 40 acres, located in 1903; three tunnels, one 304 feet long; formation quartz-porphyry; ore treated in custom mill at Yreka. Produced $6,000.

Reeder Group, in Sec. 8, T. 46 N., R. 7 W., in Fool's Paradise mining district; 6½ miles south of Hornbrook. Owner, B. C. Reeder; 120 acres, located in 1875; formation slate; three tunnels, longest 250 feet; rich pockets taken out on Bonanza claim, largest being $20,000; said to have produced $50,000 to date; owner works claims.

Robinson Gulch, in Sec. 18, T. 40 N., R. 10 W., in the Liberty mining district, 14 miles southeast of Etna Mills at an elevation of 5400 feet. Owners, Robinson Gulch Mining Company, of Etna Mills; C. M. Chase, president; A. A. Dyer, superintendent; comprises 80 acres, located in 1903; short ore shoot in hornblende schist; 100-foot tunnel; only do assessment work; small pocket discovered on the surface.

Rough & Frye, in Sec. 30, T. 12 N., R. 6 E., 11½ miles from Orleans, in the Cottage Grove mining district in Klamath Reserve. Owner, C. Frye; 40 acres located in 1913; 175-foot tunnel and open cuts on surface for 600 feet; vein is 11 feet wide; free milling; some ore runs $15 per ton; doing development work.

Ruby Basin, formerly known as the *Jumbo,* in Sec. 36, T. 40 N., R. 11 W., in the Liberty mining district; 4 miles east of Sawyer's Bar in the Klamath Reserve. Owner, I. Cullberg, Jr., of Arcata; comprises 100 acres on White's Gulch; 160-foot ore shoot; free milling, 3 feet wide, north and south strike and dip 40° E.; in slate; 800-foot tunnel, 500 feet of drifts and 60-foot stope; old 10-stamp mill, driven by water power; small producer at one time. Idle at present.

Saint Lawrence, in Sec. 12, T. 43 N., R. 10 W., in the Quartz Valley mining district, 6 miles north of Greenview. Owner, A. G. Myers; comprises 20 acres; pockets in the quartz-porphyry; 220-foot tunnel. Idle.

Skelton, in Sec. 26, T. 41 N., R. 9 W., in the Liberty mining district, 5 miles southeast of Etna Mills in the Klamath Reserve. Owner, D. Skelton; comprises 20 acres, located in 1893; 130-foot vein, 4 feet wide, but base in character and probably too low grade to pay to work, as it only carries $3 in gold per ton, 2% copper and a little silver. Idle at present.

Specimen, in Sec. 15, T. 40 N., R. 9 W., in the Callahan mining district, 5 miles west of Callahan in the Klamath Reserve. Owner, W. Ellis; comprises 60 acres, on Craig's Gulch; short ore shoot in hornblende schist; worked for pockets, and some rich specimens extracted; 150-foot tunnel. Idle at present.

Bibl.: Report XIII, p. 427.

Star, in Sec. 12, T. 43 N., R. 10 W., in the Quartz Valley mining district, 6 miles north of Greenview. Owner, F. Star; comprises 20 acres, located in 1882; pockets in the quartz porphyry; 700-foot tunnel. Idle.

Sterling, in Sec. 20, T. 42 N., R. 8 W., in the Deadwood mining district, 13 miles northwest of Fort Jones at an elevation of 7300 feet. Owner, W. Crocker; comprises 40 acres on east fork of Deadwood Creek; short ore shoot in slate and diabase; worked for pockets; some rich ore extracted; 620-foot tunnel; only do assessment work.

Bbl.: Report XIII, p. 428.

Sundown, in Sec. 19, T. 47 N., R. 7 W., in Virginia Bar mining district, 4 miles north of Gottville in Klamath Reserve. Owners, Denver Mining Company, C. A. Von, president; home office, Denver, Colorado; comprises 60 acres; formation. diorite and schist; ore shoot 100 to 120 feet long, 2 feet wide; two tunnels, 150 and 800 feet long; 5-stamp mill driven by water power; 1 mile ditch from Dutch Creek; small production. Idle.

Taft, in Sec. 30, T. 11 N., R. 8 E., in Liberty mining district, 9 miles northeast of Forks of Salmon by trail; in Klamath Reserve; at an elevation of 2800 feet. Owner, C. Taylor; comprises 40 acres, located in 1908; pocket gold in slate; 100-foot tunnel; small production. Idle.

Teddy-Avalon, in Sec. 18, T. 47 N., R. 7 W., in Virginia Bar mining district, 7 miles north of Gottville in Klamath Reserve. Owner, E. J. Durkee; comprises 40 acres; formation is granite; short ore shoot, 1 foot wide; 125-foot tunnel; little high grade taken out; free milling.

Trail Creek, in Sec. 12, T. 39 N., R. 10 W., in the Salmon River mining district, 12 miles west of Callahan in the Klamath Reserve. Owner, Trail Creek Mining Company, of Callahan; George A. Foster, president and superintendent; George Hart, secretary; comprises 100 acres on Trail Creek at an elevation of 7200 feet, reached by trail from Callahan. The fissure vein occurs between schist walls, with a strike of N. 40° W., and a dip of 60° N.; ore shoot is 300 feet long and 2 feet wide; workings consist of an 850-foot tunnel, several small drifts and a stope 200 feet in length; equipment consists of two 3½-foot Huntington mills (capacity is 20 tons in twenty-four hours, through 50-mesh screen) run by waterpower; tools, ore cars and dwellings; seven men are employed; owner claims an ore reserve of 3000 tons of rock; free milling; yearly production 1912 (seventy days' run) was $15,000; production to date $40,000; best prospect in the district.

Twan & Hannan, in Sec. 30, T. 12 N., R. 6 E., 11 miles from Orleans in the Cottage Grove mining district in Klamath Reserve.

Owners, Twan & Hannan; comprises 40 acres; 400-foot crosscut tunnel, in porphyry; only do assessment work; ledge 4 feet wide on the surface; some ore crushed and treated in cyanide mill at Champion.

Uncle Sam Consolidated, formerly known as the *Sheffield,* in Secs. 3 and 10, T. 39 N., R. 11 W., in the Liberty mining district, 7 miles south of Sawyer's Bar in the Klamath Forest Reserve. Owners, Sheffield Estate; comprises 60 acres between White and Eddy gulches, located in 1873. Length along the lode, 3000 feet; length of ore shoot, 110 feet, and width 2 feet; vertical depth below outcrop, 300 feet; strike N. 20° E., dip 25° NE.; footwall, slate; hanging wall, quartz-porphyry; length driven on vein, 420 feet; ore free milling; water supply from White's Gulch through 1½ miles of ditch and ½ mile of flume; old workings consisting of stopes and drifts are caved; equipment consists of dwellings and old 8-stamp mill, 780-pound stamps; producer for several years; some good ore in workings. Idle at present.

Bibl.: Report VIII, p. 619; XI, p. 433; XII, p. 293; XIII, p. 431.

Wicks, in Sec. 13, T. 44 N., R. 10 W., in the Deadwood mining district, 12 miles northwest of Fort Jones at an elevation of 6200 feet. Owner, Weeks Bros.; comprises 40 acres; short ore shoot in diabase, badly faulted; little high grade extracted on the surface; 150-foot tunnel. Idle.

White Bear, in Sec. 13, T. 39 N., R. 12 W., in the Liberty mining district, 9 miles southwest of Sawyer's Bar in the Klamath Reserve. Owners, Daggett & Smith; comprises 20 acres, north of the Black Bear, on an east and west vein; ore shoot is 100 feet long and 2 feet wide, with a dip of 30° E.; 400-foot tunnel and 2 drifts, each 80 feet in length; equipment: dwelling and 5-stamp mill; good prospect, but only small amount of development work; owners expect to employ several men during the winter. One man at work at present.

Zarina, in Sec. 33, T. 41 N., R. 10 W., in the Liberty mining district, 9½ miles southeast of Etna Mills in the Klamath Reserve. Owners, Zarina Mining Company, of Etna Mills; J. W. Harris, superintendent; comprises 100 acres, located in 1900; elevation, 6500 feet; ore shoot, 130 feet long and 2 feet wide; dioritic schist walls; 350 and 80-foot tunnels, drifts and stopes; equipment consists of dwellings and 5-stamp mill, driven by water power from lake above the property; small producer; not worked on any scale since 1911. One man employed at present; best ore found in pockets, similar to the Highland.

GOLD MINES—PLACER.

A succession of terraces or benches of considerable width covered with trees and shrubbery and containing auriferous gravel banks, which range from 50 to 200 feet in height, are frequent along the Klamath River and its tributaries. These benches are often miles in extent, being frequently cut by the more modern and deeper channels, and were probably formed by glacial action, causing the river to seek a new channel, for the rim rocks are intact and sharply defined and were not worn away gradually. These old gravel channels have played an important part in the mining production of this county.

An important change has taken place at the junction of the Scott River with Klamath, for here are found terraces or benches, usually three in number, with well defined trough-shaped depressions, rims intact, receding and ascending gradually from the river bed or its banks and forming a series of steps from 200 to 300 feet apart and from 50 to 200 feet between respective channels. These are evidently the old river courses, buried in places 100 feet deep under the rocky debris that had slid from the mountain side during a cataclysm of nature, causing new channels cutting deeper into the rocky formation, to be formed. These deposits have been worked by both drift and hydraulic mining.

Approximate production of placer mines, along the Klamath River from Humbug Creek to Scott River (from a known area):

Name of property	Size of ground worked			Number of cubic yards	Value taken out	Average per cubic yard
	Length in feet	Width in feet	Depth in feet			
Virginia Bar	100	50	10	1,851	$30,000	$16 20
M. Mott, at head of Virginia Bar	50	16	10	296	8,000	27 00
Centennial	685	40	40	40,000	97,000	2 42
Manzanita Bar	1,600	200	25	296,296	300,000	1 01
Yankee Dam	100	60	4	888	13,000	14 62
Vatinell & Co.	150	50	6	1,666	8,000	4 80
Pierson & Co. below Oak Bar	150	20	3	836	7,300	8 72
Poverty Point drift mine	1,500	30	6	10,000	23,000	2 36
Maplesden wing dam	150	30	30	5,000	30,000	6 00
Daggett	200	50	5	1,851	25,000	13 50
Kols wing dam	60	30	6	400	1,100	2 75

Portuguese Company, at Oak Bar, took out, with eleven men and use of derrick, in three days, by hand shoveling, $3000, or at rate of $1000 per day.

China Sam took out in one tub, or 5 cubic yards, 8 ounces of gold, valued at $134.

Wm. McConnell's claim, Humbug Creek, took out in one season, $34,000; same claim, next season, $28,000; same claim, next season, $22,000; total, $84,000; pick and shovel, and use of derrick, from one acre.

Daggett Mine, worked with pick and shovel, with four men, averaged $100 per day for several months.

From Pine Grove Mine, from a pit 100 feet square, on bedrock, and 18 feet deep, $6,000 was extracted.

GOLD MINES—HYDRAULIC.

Bark House Creek, in Secs. 23 and 26, in Oak Bar mining district, 26 miles west of Hornbrook in Klamath Reserve. Owners, N. E. and P. C. Lange; comprises 200 acres; micaceous schist bedrock; coarse gold found in crevices of bedrock; good producer years ago. Idle at present.

Beaudry, in Secs. 3, 11, 34, 35, 30, 26, 2 and 23, T. 39 and 40 N., R. 8 and 9 W., in the Callahan mining district, 1 mile southeast of Callahan in the Klamath Reserve is the best paying hydraulic mine in this district. Owner, J. Beaudry; comprises several of the old placer locations, with an area of 640 acres on Scott River and Wildcat Creek; the bedrock is schist; gravel 20 to 60 feet deep; water is obtained from South Fork of Scott River and Wildcat Creek through two ditches, one 15 and the other 2 miles in length; 7 giants, 4000 feet of pipe and three dwellings on the property; six men employed at present making repairs to ditches; use fifteen men during the season; production said to be from $25,000 to $40,000 per year.

Belle Josephine, formerly known as *Slide Creek,* in Sec. 14, T. 39 N., R. 9 W., in the Callahan mining district, 6 miles southwest of Callahan in the Klamath Reserve. Owner, A. E. Westover; comprises 160 acres, on Slide Creek, including the Abers, Carter and other old placer mines, which have been noted producers; schist bedrock; 30 to 50 feet of gravel; water from Slide Creek through a ditch 2 miles long, carrying 1100 inches; equipment consists of four giants, 2500 feet of pipe and two dwellings; twelve men employed during operating season, but only three men at present. Cost about $1500 per year for ditch repairs; property is paying dividends.

Bloomer, in Secs. 33 and 34, T. 11 N., R. 7 E., in the Liberty mining district, 6 miles northwest of Forks of Salmon in the Klamath Reserve. Owners, Bennett Company; comprises 51 acres of patented land; bedrock is schist; worked extensively years ago and was good producer. Idle.

Bibl.: Report VIII, p. 612; XII, p. 278; XIII, p. 390.

Blue Gravel, formerly known as the *Black Lead,* in Sec. 32, T. 45 N., R. 7 W., in the Greenhorn mining district, 2 miles south of Yreka in Klamath Reserve. Owners, Smith & Lee; comprises 200 acres, located in 1888; it was a famous placer producer at one time; slate bedrock;

10 feet of gravel; about 60 acres have been worked. Idle since 1910; has been drilled for dredging ground.

Bibl.: Report XIII, p. 390.

Blue Hill, in Sec. 16, T. 45 N., R. 10 W., in the Scott Bar mining district, $\frac{1}{8}$ mile south of Scott Bar in the Klamath Reserve. Owner, E. Jacobs; comprises 20 acres, along Scott River; slate bedrock; 20 to 40 feet gravel; water from Mill Creek through a ditch $\frac{1}{2}$ mile long; equipment one giant and 1000 feet of pipe; worked on a small scale. Idle on account of lack of water.

Bowersox, in Sec. 2, T. 11 N., R. 7 E., in the Liberty mining district at Somes Bar in Klamath Reserve. Owner, W. P. Bowersox; comprises 40 acres; schist bedrock; 20 feet of gravel. Idle; only worked to limited extent.

Brown & George, in Sec. 1, T. 38 N., R. 11 W., in the Liberty mining district, 14 miles southeast of Sawyer's Bar in the Klamath Reserve. Owners, Banner Mining Company; T. H. George, superintendent; comprises 40 acres on Shattuck Creek; schist bedrock; 10 to 40 feet of gravel; two giants and 1000 feet of pipe. Idle.

Bibl.: Report XIII, p. 391.

Campbell, in Secs. 1, 2, 11, 12, 13 and 14, T. 43 N., R. 10 W., in the Quartz Valley mining district, 6 miles north of Greenview. Owners, Weed & Gardner; holdings comprise 1500 acres of patented land, being practically all the placer ground in this district, and includes the old Hull Gulch, Sucker Flat, Smith & Hand, Van Duzen Gulch and Meads Gulch properties; bedrock is quartz-porphyry; gravel from 20 to 80 feet deep; water from Kidder and Shackleford creeks, through two ditches, one 14 and the other 5 miles long; equipment consists of three giants, and 3000 feet of pipe. Idle since 1910; some rich gravel; at one time a large production was obtained from these mines.

Bibl.: Report XII, p. 279; XIII, p. 392.

Cecilville, formerly known as the *Sightman,* in Sec. 30, T. 38 N., R. 11 W., in the Liberty mining district, 15 miles southeast of Sawyer's Bar in the Klamath Forest Reserve. Owner, G. H. Sightman; comprises 40 acres on Crawford Creek; schist bedrock; 20 to 60 feet of gravel; water from Crawford Creek through $2\frac{1}{2}$-mile ditch; one giant and 800 feet of pipe; only worked on a limited scale during the winter; small producer.

China Creek, formerly known as the *Reeves,* in Sec. 5, T. 16 N., R. 7 E., in the Happy Camp mining district, 6 miles northeast of Happy Camp in the Klamath Forest Reserve. Owner, Chinese Company; comprises 40 acres of patented land; schist bedrock; 10 to 40 feet of gravel. Idle several years; good producer in the past.

Bibl.: Report XIII, p. 393.

Classic Hill, in Sec. 36, T. 18 N., R. 6 E., in the Happy Camp mining district, 12 miles north of Happy Camp in the Klamath Forest Reserve. Owner, C. Wheeler; comprises 43 acres of patented land; schist bedrock; 5 to 30 feet of gravel; water from west branch of Indian Creek through a ditch 5 miles long, carrying 600 inches; equipment consists of two giants and 1000 feet of pipe; has been a good producer. Idle.

Bibl.: Report XIII, p. 394.

Crapo, in Sec. 11, T. 10 N., R. 7 E., 3 miles southwest of Forks of Salmon in Klamath Forest Reserve. Owners, Bennett Company; comprises 39 acres of patented ground; slate bedrock; 20 feet of gravel. Idle.

Bibl.: Report VIII, p. 612; XII, pp. 280, 282; XIII, p. 396.

Cronin, in Sec. 22, T. 40 N., R. 12 W., in the Liberty mining district, 7 miles west of Sawyer's Bar in the Klamath Forest Reserve. Owner, French Syndicate of Paris, France; J. Sapp, watchman; comprises 40 acres, patented, on West Fork of Salmon River; slate bedrock; 30 to 100 feet of gravel; water from Boulder Gulch through 2-mile ditch carrying 800 inches; 5 giants, 3000 feet of pipe, derrick and dwellings; good producer at one time. Idle since 1910.

Bibl.: Report XIII, p. 396.

Davis, formerly known as the *Van Brunt*, in Sec. 11, T. 16 N., R. 7 E., in the Happy Camp mining district; ⅛ mile southwest of Happy Camp, was located in 1870 and has been worked since that time. It is owned by R. A. Davis, of San Francisco, and comprises 200 acres of patented land along the Klamath River; the bedrock is schist and the gravel in places is more than 100 feet deep. Water is obtained from the South Fork of Indian Creek, through a ditch 10 miles long, having a capacity of 120 inches and which cost $40,000; equipment consists of three giants, sluice boxes and 2000 feet of pipe; twelve men employed during operating season; cost of operating about $10,000 (period of five months); pays dividends; small amount of platinum obtained. (See photo No. 3.)

Denny, in Secs. 17, 20, 21 and 29, T. 40 N., R. 8 W., in the Callahan mining district, in town of Callahan, in the Klamath Reserve. Owners, Scott River Dredge Company; comprises 400 acres of old locations along the Scott River, 118 acres of which is patented; schist bedrock; 20 to 60 feet of gravel, some boulders and some cement near the bedrock; 3-mile ditch from South Fork of Scott River; ground

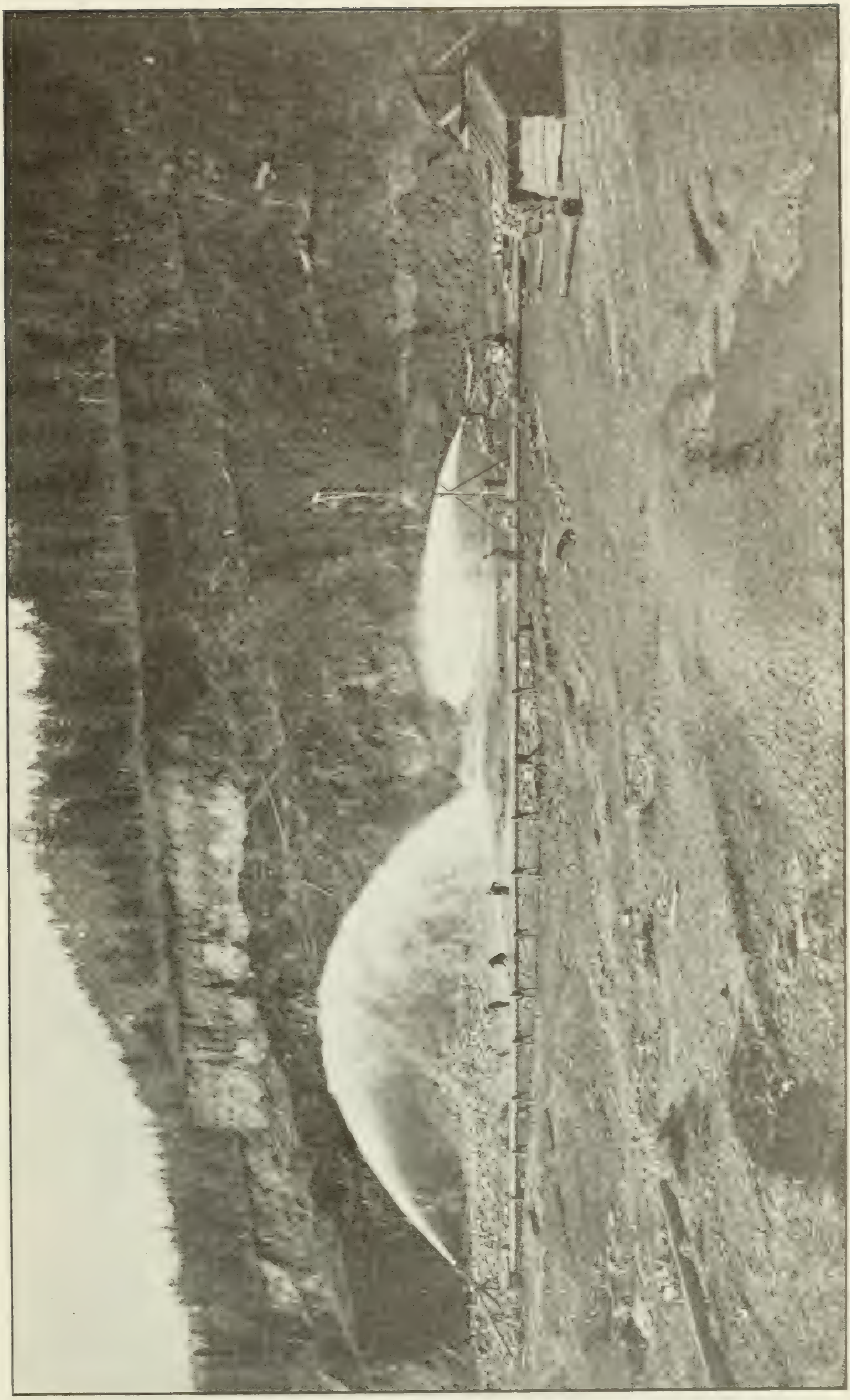


Photo No. 3. Davis hydraulic mine—Happy Camp.

noted placer producer in the early days; company endeavored to work the bed of Scott River with a small dredge, but did not understand this business and dismantled the boat in 1910 and sold the machinery; property idle since that time; some good ground yet to be worked.

Dick Morris, formerly known as the *Ramis,* in Sec. 35, T. 46 N., R. 11 W., in the Hamburg Bar mining district, 1¾ miles northwest of Hamburg Bar in the Klamath Reserve. Owners, Johnson & Hanses; comprises 40 acres; schist bedrock; 10 to 30 feet of gravel; two giants and 500 feet of pipe. Idle. Adjoins Hammer on the north.

Dunnigan, in Sec. 20, T. 12 N., R. 6 E., in the T-Bar mining district, 36 miles (by trail) south of Happy Camp in the Klamath Forest Reserve. Owners, Dunnigan Consolidated Mining Company, of San Francisco; E. M. Wilbur, president; Mrs. E. J. Wilbur, secretary; J. M. Stickel, general manager; holdings comprise 160 acres, consisting of old benches; portion of land worked in the early days and relocated by J. M. Stickel in 1912; water obtained from T-Bar Creek through ditch ¼ mile long; bedrock in serpentine and slate; depth of gravel from 10 to 40 feet (loose); equipment consists of two giants, 2000 feet of pipe, dwelling and sluice boxes; one man employed at present; company intends to work a full crew in the spring; said to be good ground.

Eastlick, in Secs. 17 and 18, T. 43 N., R. 9 W., in the Oro Fino mining district, 5 miles northeast of Greenview. Owners, Richman & Beems, of Fort Jones; comprises 67 acres of patented land; bedrock is quartz-porphyry; 30 to 60 feet of gravel; two ditches from Mill and Kidder creeks, one 6 miles and the other 4 miles long; equipment consists of three giants and 2600 feet of pipe; noted property at one time and yielded good returns. Idle for past three years.

Bibl.: Report VIII, p. 608; XII, p. 281; XIII, p. 398.

Elliott, formerly known as the *Golden Nugget,* in Sec. 20, T. 40 N., R. 11 W., in the Liberty mining district, ¾ mile north of Sawyer's Bar in the Klamath Forest Reserve. Owner, M. L. Elliott; comprises 20 acres, patented, on Jackass Gulch; slate bedrock; 15 to 40 feet of gravel; two giants, 1000 feet of pipe and derrick; water from Jackass Gulch through a flume 1½ miles long; good production in 1911; coarse gold on bedrock; worked in winter.

Bibl.: Report VIII, p. 603.

Ellston, in Sec. 33, T. 11 N., R. 7 E., in the Liberty mining district, 10 miles northwest of Forks of Salmon in Klamath Forest Reserve. Owner, A. E. Ellston; comprises 30 acres; slate bedrock; 20 feet of gravel. Idle; only does assessment work; some rich gravel worked years ago.

Espey, in Sec. 25, T. 47 N., R. 9 W., in the Oak Bar mining district, 30 miles northwest of Hornbrook. Owners, Espey Mining Company; home office, Seattle, Wash.; in Klamath Reserve; 50 acres of ground; bedrock is schist. Idle on account of lack of water.

Fir Tree, in Secs. 19 and 20, T. 10 N., R. 8 E., in the Liberty mining district, 1 mile southeast of Forks of Salmon in Klamath Forest Reserve. Owners, Bennett Company; comprises 20 acres of patented ground; schist bedrock; 10 feet of gravel; 2½-mile ditch from Salmon River. Idle; has not been worked for several years.

Forks, formerly known as *McNeals*, in Sec. 13, T. 10 N., R. 7 E., in the Liberty mining district, in town of Forks of Salmon in the Klamath Forest Reserve. Owners, Bennett Company; comprises 50 acres; schist bedrock; 20 feet of gravel. Idle; under option to the La Grange Mining Company; some rich gravel.

Bibl.: Report XII, p. 287; XIII, p. 401.

Forks of Salmon River, in Secs. 16, 17, 18, 13, 7, 8 and 9, T. 10 N., R. 7 and 8 E., in the Liberty mining district, 1½ miles northeast of Forks of Salmon in the Klamath Forest Reserve, is the largest hydraulic

Photo No. 4—Dam—Forks of Salmon River Mining Company.

mine in this district. It is owned by the Forks of Salmon River Mining Company, of San Francisco; F. Salvage, president; V. G. Bonaly, secretary, and M. A. Singer, superintendent. The holdings comprise 520 acres of old placer locations, which were rich diggings in the early days. This company controls some 4 miles of the old channels and bars along the North Fork of Salmon River. The bedrock is schist, with 20 to 60 feet of gravel covering the same; only about 3 acres of ground have been worked. Water is obtained from the North Fork of the Salmon River through a ditch carrying 3800 inches, having a length of 4 miles and a 50-foot pressed overflow dam impounds the water at the intake. The equipment consists of five giants, machine shop, small electrical plant, pipe, derricks, and dwellings; sixteen men at $3 per day are employed. In 1911 and 1912, the yearly production exceeded $60,000; has produced over $200,000 since 1908.

Fort Goff, in Sec. 31, T. 47 N., R. 12 W., in the Seiad mining district, 14 miles west of Hamburg Bar in the Klamath Reserve. Owner, G. Martin; comprises 80 acres of patented land along the Klamath River; schist bedrock; 10 to 60 feet of loose gravel; water obtained from Fort Goff Creek through a ditch 1½ miles long carrying 800 inches; equipment consists of two giants and 3100 feet of pipe; has not been worked since 1911; some good ground; small producer.

Bibl.: Report VIII, p. 596; XII, p. 283; XIII, p. 401.

Gardner and Deming, in Secs. 7 and 18, T. 43 N., R. 9 W., in the Oro Fino mining district, 5½ miles northeast of Greenview. Owners, Weed & Gardner; comprises 150 acres of patented land; bedrock is quartz-porphyry with quartz stringers running through it; 10 to 50 feet of gravel. Idle.

Bibl.; Report XIII, p. 402.

Geeshan and Kellner, in Sec. 30, T. 40 N., R. 11 W., in the Liberty mining district, 2 miles west of Sawyer's Bar in the Klamath Reserve. Owners, Geeshan & Kellner; comprises 20 acres on the Klamath River; slate bedrock; 50 feet of gravel; water from North Fork of Salmon River through 1½-mile flume; one giant, 1200 feet of pipe and derrick; has been a good producer; worked on a small scale during the winter.

Gold Hill, in Secs. 28 and 29, T. 40 N., R. 11 W., in the Liberty mining district, in town of Sawyer's Bar in the Klamath Reserve. Owners, G. W. and O. R. Bigelow; comprises 80 acres on North Fork of Salmon River; slate bedrock; 10 to 80 feet of gravel; water from Eddy's Gulch through 2 miles of ditch; three giants, 1200 feet of pipe and hand derrick; good producer; operated during the winter when water is plentiful.

Gordan, in Sec. 17, T. 18 N., R. 7 E., in the Happy Camp mining district, 5 miles northeast of Happy Camp in Klamath Reserve. Owner,

C. Gordan; comprises 60 acres; schist bedrock; 30 feet of gravel; three men employed during operating season; yearly production about $4000.

Bibl.: Report XII, p. 283; XIII, p. 403.

Grider, in Secs. 12, 15, 10, 14 and 11, T. 46 N., R. 12 W., in the Seiad mining district, 9 miles southwest of Hamburg Bar in Klamath Reserve. Owner, J. B. Grider; comprises 245 acres, patented; on the Klamath River; schist bedrock; 10 to 40 feet of gravel; water from Grider Creek through 3-mile ditch of a capacity of 240 inches; equipment consists of dwellings, two giants and 1500 feet of pipe; operating season from four to five months; average production monthly of $2000. Idle at present on account of lack of water.

Bibl.: Report VIII, p. 600; XIII, p. 403.

Haley, formerly known as the *Halstead,* in Sec. 7, T. 16 N., R. 7 E., in the Happy Camp mining district, 10 miles southwest of Happy Camp in Klamath Reserve. Owner, M. Doolittle; comprises 40 acres of patented land; schist bedrock; 10 to 30 feet of gravel; some boulders and some cement. Idle for several years.

Bibl.; Report VIII, p. 601; XIII, p. 404.

Hammer, in Secs. 36, 1 and 4, T. 46 N., R. 11 W., in the Hamburg Bar mining district, ½ mile west of Hamburg Bar in the Klamath Forest Reserve. Owners, Johnson & Caldwell; comprises 60 acres along the Klamath River; schist bedrock; 30 to 40 feet of gravel; water from Kuntz and Mill creeks through a 3-mile ditch; four giants, 1000 feet of pipe, and dwelling; property leased; worked one month in 1913 and produced $400; some good ground. Idle at present.

Happy Home, formerly known as the Maplesden, in Sec. 31, T. 46 N., R. 10 W., in the Hamburg Bar mining district in the Klamath Forest Reserve, ¼ mile east of Hamburg Bar. Owner, Maplesden Brothers; comprises 40 acres on the Klamath River; schist bedrock; large portion of this ground has been worked; good pay on bedrock; two men are employed cleaning up the sluice boxes.

Bibl.: Report VIII, p. 594.

Hardscrabble, in Secs. 1 and 12, T. 44 N., R. 9 W., in the Deadwood mining district, 6 miles north of Fort Jones. Owner, J. D. Duane; comprises 20 acres, patented, on McAdams Creek; quartz-porphyry bedrock; 30 to 50 feet of gravel; water from McAdams Creek through a ditch 2 miles long; rich diggings years ago, worked by Chinese. Idle at present.

Bibl.: Report XIII, p. 404.

Hickey, in Secs. 24 and 25, T. 40 N., R. 12 W., in the Liberty mining district, 2 miles west of Sawyer's Bar in the Klamath Forest Reserve. Owners, Pike & Hickey; comprises 20 acres, patented, on North Fork of Salmon River; slate bedrock; 25 to 70 feet of gravel; water from North Fork of Salmon River through 3-mile ditch. Idle in 1913; small producer when operated.

Bibl.: Report XIII, p. 405.

Hi You, in Sec. 29, T. 44 N., R. 8 W., in the Deadwood mining district, 8 miles north of Fort Jones. Owners, Wyman and Richman; comprises 40 acres, patented, on Deadwood Creek; quartz-porphyry bedrock; 30 to 50 feet of gravel; water from Deadwood Creek through a ditch 1¼ miles long; two giants and 2000 feet of pipe; only worked a few times since 1905; good producer years ago.

Bibl.: Report XIII, p. 405.

Hooper Hill, formerly known as *Preckel,* in Sec. 21, T. 45 N., R. 10 W., in the Scott Bar mining district, ½ mile southeast of Scott Bar in the Klamath Reserve. Owner, H. Preckel; comprises 20 acres along Scott River; slate bedrock; 20 feet of gravel; water from Pat Ford Creek through 1 mile of ditch; equipment: one giant, 1100 feet of pipe and dwelling; worked on a small scale. Idle on account of lack of water.

Hoosier Hill, in Sec. 36, T. 46 N., R. 11 W., in the Hamburg Bar mining district, ½ mile west of Hamburg Bar in the Klamath Forest Reserve. Owner, C. L. Willard; comprises 32 acres of patented ground, located in 1856; bedrock is schist; 20 to 50 feet of gravel; two giants and 800 feet of pipe; rich ground worked years ago; leased, and only short season in 1913 due to shortage of water; small production.

Huey Hill, in Sec. 25, T. 18 N., R. 6 E., in the Happy Camp Mining district, 14 miles north of Happy Camp in Klamath Forest Reserve. Owner, D. Huey; comprises 40 acres, patented; schist bedrock; 20 feet of gravel; two giants and pipe; only worked in a limited way; small producer; some good gravel.

Bibl.: Report XIII, p. 407.

Imperial Heights, in Sec. 33, T. 40 N., R. 11 W., in the Liberty mining district, 2 miles south of Sawyer's Bar in the Klamath Forest Reserve. Owner, Ed Hickey; comprises 40 acres on North Fork of Salmon River; slate bedrock; 20 to 80 feet of gravel; water from Shellatoe Gulch through 2-mile ditch; 2 giants, 1700 feet of pipe and derrick; operated during the winter; small producer.

Jack Lowden, in Sec. 13, T. 46 N., R. 12 W., in the Seiad mining district, 10 miles west of Hamburg Bar in the Klamath Reserve. Owner, J. S. Lowden; comprises 140 acres of patented land along the Klamath River; slate bedrock; 5 to 40 feet of gravel; water from

Walker Creek through 2½-mile ditch of 1500 inches capacity; one giant and 2500 feet of pipe; four to five month operating season; good ground.

Joe Ramus, in Sec. 6, T. 45 N., R. 10 W., in the Scott Bar mining district, 3 miles north of Scott Bar, on Scott River in the Klamath Forest Reserve. Owner, G. A. Milne; comprises 60 acres; slate bedrock; 20 feet of gravel; water from Tom Creek; through 2½ miles of ditch; equipment: two giants and 1000 feet of pipe; yearly production about $7500; worked years ago by rocker and said to have produced $500,000; two men employed at present; idle on account of lack of water; some good ground.

Klein, formerly known as the *Casey,* in Sec. 4, T. 39 N., R. 11 W., in the Liberty mining district, 2½ miles south of Sawyer's Bar in the Klamath Forest Reserve. Owner, Woodfill & Luddy; comprises 50 acres; slate bedrock; 30 feet of gravel; water from Eddy's Gulch through ½ mile of ditch; one giant and 500 feet of pipe; worked on a small scale during the winter; small producer.

Bibl.: Report XII, p. 286; XIII, p. 411.

Lowden, formerly known as *McCreary,* in Secs. 2 and 35, T. 45 and 46 N., R. 11 W., in the Hamburg mining district, ½ mile south of Hamburg Bar in the Klamath Forest Reserve. Owner, J. S. Lowden; comprises 60 acres, 20 of which are patented, and follows the course of the Klamath River; schist bedrock; 10 to 40 feet of gravel; water from Tom Creek through a ditch 2 miles long; two giants and 1000 feet of pipe; worked on a small scale; idle on account of scarcity of water.

Bibl.: Report XII, p. 286; XIII, p. 413.

McGuffey, in Sec. 16, T. 45 N., R. 10 W., in the Scott River mining district, in town of Scott Bar in Klamath Forest Reserve. Owner, T. G. McGuffey; comprises 40 acres, on Scott River, located in 1873; slate bedrock; 20 to 40 feet of gravel; equipment consists of two giants, and 600 feet of pipe; worked on a small scale; has been a good producer.

Bibl.: Report XII, p. 287; XIII, p. 415.

Michigan-Salmon, formerly known as the *Red Hill,* in Secs. 19, 20, 21 and 28, T. 10 N., R. 8 E., 1½ miles east of Forks of Salmon in the Klamath Forest Reserve, is one of the noted hydraulic mines in the Liberty district, and comprises 600 acres, 40 of which are patented. It is owned by the Michigan-Salmon Mining Company of Detroit, Mich.; president, S. Stevens; secretary, George Whitworth; superintendent, L. E. Taggett. These holdings, extending along the Salmon River for a distance of 2½ miles, consisting of old river bars and benches, include the well known Red Hill, Missouri Bar, Cash, Clovis and Rocky Bar placers, which were good producers during pioneer mining days. The general course of the channel is southwest; depth of gravel 20 feet; bedrock consists of slate and schist; about 60 acres have been worked; water is obtained from Knownothing Creek through 1 mile of ditch and 3 miles of flume, having a capacity of 40 inches; the equipment consists of two Ruble elevators (which are 90 feet long, 8½ feet wide and pitch at an angle of 17°), dwellings, three giants, pipe, etc.; six men employed continually and twelve during operating season of seven months; operating cost about $12,000 per year; good profit made from operations.

Bibl.: Report VIII, p. 615; XII, p. 290; XIII, p. 422.

Milich, in Sec. 2, T. 10 N., R. 7 E., in the Liberty mining district, 5 miles northwest of Forks of Salmon. Owner, P. Milich; comprises 20 acres; schist bedrock; 30 feet of gravel; water from Crapo Creek through 1½-mile ditch. Idle since 1911.

Bibl.: Report XII, p. 288; XIII, p. 415.

Native Son, in Sec. 13, T. 10 N., R. 7 E., in the Liberty mining district, 1 mile northeast of Forks of Salmon in the Klamath Forest Reserve. Owner, M. L. Mills; comprises 20 acres; schist bedrock, coarse gold being found on same; 30 feet of gravel; adjoins Forks of Salmon mine; only short season's run on account of lack of water; some good gravel.

Nordheimer, formerly known as *McNeal,* in Sec. 3, T. 10 N., R. 7 E., 5 miles southwest of Forks of Salmon in Klamath Forest Reserve. Owners, Nordheimer Mining Company; H. B. Morey of Menlo Park, secretary; Ed Kingston, superintendent; comprises 60 acres of patented land on Salmon River; schist bedrock; 15 to 25 feet of gravel; equipment two giants, pipe and dwellings; five men employed at rate of $3 per day; has been a good producer. Idle on account of lack of water.

Bibl.: Report VIII, p. 611.

The Pine Grove, hydraulic mine, in Sec. 10, T. 46 N., R. 9 W., in the Oak Bar mining district; is one of the famous placer properties on the Klamath River. It is 28 miles west of Hornbrook at an elevation of 2600 feet and comprises an old river bar containing 100 acres. The pay gravel is over 1000 feet wide in places, with a depth of 18 feet and a northeast and southwest course, following the south bank of the Klamath River. The bedrock is schist of medium hardness, and coarse gold is found here. It was formerly worked with hydraulic elevators, but at present a drag scraper is used to convey the gravel to the sluice boxes, a 2-reel steam hoist being attached to the scraper. Water for the sluice boxes is pumped from the river. Wood is the fuel used. The owner, H. H. Barton, has bonded this group to W. B. Carlock, of San Francisco; eight men are employed; about 30 acres have been worked and some of this ground, removed years ago, was very rich. From a pit 100 feet square on bedrock, at a depth of 18 feet, over $6000 was taken out. In one day $300 of bedrock pay was panned out.

Bibl.: Report VIII, p. 592.

Portuguese, in Sec. 4, T. 46 N., R. 12 W., in the Seiad mining district, 12 miles west of Hamburg Bar in the Klamath Forest Reserve. Owner, H. Wood; comprises 140 acres of patented land along the Klamath River; schist bedrock; 20 to 50 feet of gravel, with from 4 to 10 feet of cemented gravel in places, requiring blasting; water is obtained from Portuguese Creek through 1½-mile ditch; equipment consists of three No. 2 giants, dwellings and 2500 feet of pipe; yearly production from $10,000 to $15,000; about 30 acres have been worked to date; bonded to Jerome Mining Company, of San Francisco. Idle on account of lack of water.

Bibl.: Report VIII, p. 595; XII, p. 290; XIII, p. 420.

Quartz Gulch, formerly known as *Wingate Hill,* in Secs. 5 and 6, T. 15 N., R. 7 E., in the Happy Camp mining district, 8 miles southwest of Happy Camp in the Klamath Forest Reserve. Owner, J. H. Wells; comprises 40 acres of patented land; slate bedrock, 10 to 20 feet of gravel. Idle for several years; good producer at one time.

Bibl.: Report VIII, p. 601.

Russian Hill, formerly known as *Russian Dump, Ahlgren* and *Red Hill,* in Secs. 23 and 24, T. 40 N., R. 12 W., in the Liberty mining district, 5 miles west of Sawyer's Bar. Owner, A. Ahlgren; comprises 80 acres on North Fork of Salmon River; slate bedrock; 40 to 80 feet of gravel; water from North Fork of Little Salmon River, through 3-mile ditch; two giants, 2800 feet of pipe and derrick; good producer, having been worked since the eighties; operated during the winter.

Bibl.: Report XII, p. 276; XIII, p. 386.

Rycroft, in Sec. 14, T. 39 N., R. 9 W., in the Callahan mining district, 6½ miles southwest of Callahan in the Klamath Forest Reserve. Owner, S. Rycroft; comprises 60 acres, on Slide Creek; schist bedrock; 20 to 40 feet of gravel; two giants and 1000 feet of pipe; considerable gold extracted in past years. Idle. Do only assessment work.

Bibl.: Report XIII, p. 423.

Sauer Kraut, in Sec. 34, T. 11 N., R. 7 E., in the Liberty mining district, 9 miles southwest of Forks of Salmon in Klamath Forest Reserve. Owners, Chinese Company; comprises 40 acres of patented land; slate bedrock, 15 feet of gravel; produces about $2000 per year;

rich gravel in the early days. Idle on account of lack of water; use two No. 2 giants.

Bibl.: Report XII, p. 291; XIII, p. 424.

Seiad, in Sec. 11, T. 46 N., R. 12 W., in the Seiad mining district, 9½ miles west of Hamburg Bar in Klamath Forest Reserve. Owner, T. K. Towne; comprises 60 acres along the Klamath River; schist bedrock; 5 to 20 feet of gravel; water from Seiad Creek through 2-mile ditch; giant and pipe; do only assessment work.

Siskiyou Klondike, in Secs. 15 and 16, in the Oak Bar mining district, 24 miles west of Hornbrook in Klamath Forest Reserve. Owner, H. H. Barton; comprises 40 acres; bedrock schist; 10 feet of gravel; 2-mile ditch from McKinney Creek; located in 1865; some production. Idle.

Siskiyou Mines Company, in Secs. 2, 1, 6, 7, 5, 12 and 18, T. 16 and 17 N., R. 7 and 8 E., in the Happy Camp mining district, in town of Happy Camp, is the largest hydraulic mine in this section. It is owned by the Siskiyou Mines Company, of New York City; Dr. Harbeck, president; C. A. Gardiner, secretary, and W. A. Maguire, superintendent. These holdings, comprising 1500 acres, of which 640 are patented, follow the Klamath River and include several famous old placer claims which were rich and which were only superficially worked by the early miners. The general course of the channel is northwest and southeast; bedrock is schist; gravel from 10 to 60 feet deep, consisting of bars and benches; water is obtained from Thompson Creek, through 3 miles of ditch and 10 miles of flume; equipment consists of five giants, several thousand feet of pipe and dwellings; ten men employed at present; operating expenses are heavy during the season.

Siskiyou River Bend, formerly known as the *Lou Daggett,* and containing 20 acres, has been worked for many years and considerable gold extracted. It is in Sec. 9, T. 46 N., R. 9 W., 30 miles west of Hornbrook, in the Oak Bar mining district, at an elevation of 2700 feet. The bedrock is schist; gravel from 20 to 50 feet deep with 10 feet of pay. The present owner, A. C. Aiken, of San Francisco, has spent considerable time and money experimenting on methods of working the ground; during the last season's run of three months $15,000 was produced. Evans hydraulic elevator is used, water being obtained from Buckhorn Creek through a ditch 9 miles in length.

Slumway, in Sec. 3, T. 10 N., R. 7 E., in the Liberty mining district, 4½ miles northwest of Forks of Salmon in Klamath Forest Reserve. Owner, Bennett Company; comprises 40 acres of patented ground; schist bedrock; 30 feet of gravel; water from Slumway Creek, through 3-mile ditch. Idle since 1910.

Squaw Gulch, also known as *French John,* in Sec. 1, T. 40 N., R. 9 W., in the Callahan mining district; 4 miles northwest of Callahan, in the Klamath Reserve. Owner, D. L. Jones; comprises 60 acres; schist bedrock; 30 feet of gravel; two giants and 800 feet of pipe; water from Sugar Creek through a ditch 9 miles long, carrying 800 inches; worked only in winter; small producer; worked years ago as a drift mine and some rich gravel removed.

Sturn, formerly known as the *Colby,* in Sec. 2, T. 16 N., R. 7 E., in the Happy Camp mining district, 1 mile north of Happy Camp in the Klamath Forest Reserve. Owner, G. H. Compton; comprises 200 acres of patented land, on old river channel; schist bedrock; equipment consists of small reservoir to collect surface waters, 2 miles of ditch, one giant, and 1000 feet of pipe; production $2000 per season of three months; lack of water limits mining operations; good ground.

Ten Eyck, in Sec. 28, T. 12 N., R. 6 E., in the Liberty mining district, 3 miles northwest of Somes Bar. Owner, W. Lord; comprises 80 acres, slate bedrock; coarse gold found in bedrock crevices; two giants; good producer for a number of years; yearly production said to exceed $20,000; fifteen men employed during season; four men working at present; water from Ten Eyck Creek.

Bibl.: Report VIII, p. 605; XIII, p. 430.

Thomain, in Sec. 5, T. 39 N., R. 11 W., in the Liberty mining district, 4 miles southeast of Sawyer's Bar in the Klamath Forest Reserve. Owners, F. and C. F. Thomain; comprises 20 acres, on Eddy's Gulch; slate bedrock; 10 to 30 feet of gravel; water from Eddy's Gulch through 1 mile of flume; one giant and 800 feet of pipe; operated only during the winter; small producer.

Two and a Half, formerly known as the *Walker,* in Sec. 20, T. 40 N., R. 7 W., in the Callahan mining district, 6 miles east of Callahan, in the Klamath Reserve. Owner, W. Walker; comprises 40 acres, on Grouse Creek; bedrock is schist; 10 to 20 feet of gravel; water from Grouse Creek through a ditch 2½ miles long carrying 600 inches; two giants and 600 feet of pipe. Idle at present; said to have produced $200,000.

Willard, in Sec. 30, T. 46 N., R. 11 W., in the Hamburg Bar mining district, ¾ mile south of Hamburg Bar in the Klamath Reserve. Owners, Willard & Hickman; comprises 20 acres along the Klamath River; schist bedrock; 30 to 50 feet of gravel; water obtained from Max Creek through 1-mile ditch; one giant and 500 feet of pipe. Only worked in a small way.

Bibl.: Report XII, p. 294; XIII, p. 432.

Wm. Burns, in Sec. 33, T. 39 N., R. 11 W., in the Liberty mining district, 2 miles southeast of Sawyer's Bar in the Klamath Reserve. Owner, J. R. Peterson; comprises 20 acres, patented; slate bedrock; 10 to 30 feet of gravel; one giant, 500 feet of pipe and a derrick. Worked during the winter season; small producer.

Windeler, in Sec. 20, T. 40 N., R. 11 W., in the Liberty mining district, 1 mile north of Sawyer's Bar in the Klamath Reserve. Owner, J. C. Windeler; comprises 20 acres on Jackass Gulch; slate bedrock; 30 feet of gravel; one giant and 500 feet of pipe; some coarse gold found on bedrock. Little work during the winter; small producer.

Wood & Fehely, in Sec. 4, T. 46 N., R. 12 W., in the Seiad mining district, 11 miles west of Hamburg Bar in the Klamath Reserve. Owners, Wood & Fehely; comprises 60 acres, patented, on the Klamath River; slate bedrock, best values being found in the soft bedrock; 10 to 30 feet of gravel; water from Thompson Creek through a ditch 1½ miles long; three giants and 1800 feet of pipe; employ four men during the season. Idle in 1912; good ground; has been a steady producer.

Bibl.: Report XIII, p. 432.

Wright & Fletcher, in Secs. 7 and 8, T. 43 N., R. 9 W., in the Oro Fino mining district, 4 miles northeast of Greenview. Owners, Wright Brothers; comprises 80 acres; bedrock is quartz-porphyry; 20 to 60 feet of gravel; water from Kidder Creek through two ditches, one 9 miles long, also furnishes power for the Johnson mill, and the other, 4½ miles in length, for the hydraulic operations; two giants and 2100 feet of pipe; best ground has been worked and yielded a good production; property only worked on a small scale. Idle on account of lack of water.

Bibl.: Report VIII, p. 609; XII, p. 294; XIII, p. 433.

GOLD MINES—GROUND SLUICING.

The extraction of gold from placer deposits by means of ground sluicing is pursued to a limited extent in the Hawkinsville, Oak Bar, Greenhorn, and Liberty mining districts.

Anderson, in Sec. 33, T. 39 N., R. 11 W., in the Liberty mining district, 1¾ miles southeast of Sawyer's Bar in the Klamath Forest Reserve. Owners, Peterson Brothers; comprises 20 acres on Eddy's Gulch; slate bedrock; 20 to 30 feet of gravel; water from continuation of Burns' flume, 1 mile in length; adjoins Burns' placer; worked on a limited scale during the winter; small producer.

Bibl.: Report VIII, p. 617.

Baines, in Sec. 13, T. 39 N., R. 12 W., in the Liberty mining district, 10 miles southwest of Sawyer's Bar in the Klamath Forest Reserve. Owner, G. A. Baines; comprises 20 acres on Bear Creek; slate bedrock;

10 to 20 feet of gravel; water from Bear Creek through ½ mile of flume; worked during the winter on a limited scale; small producer.

Beaver Creek, in Secs. 30 and 31, T. 47 N., R. 7 W., in the Virginia Dale mining district, 2 miles northwest of Gottville on Beaver Creek in Klamath Reserve. Owner, J. E. Jones; comprises 160 acres, patented; slate bedrock; 5 feet of gravel. Idle for several years.

Beaver Creek, in Sec. 6, T. 46 N., R. 8 W., in the Oak Bar mining district; 28 miles west of Hornbrook. Owners, Paines & Barton; 104 acres patented; 15 feet of gravel; schist bedrock. Idle.

Big Slide, in Sec. 19, T. 46 N., R. 8 W., in the Oak Bar mining district, 28 miles west of Hornbrook in the Klamath Forest Reserve. Owner, E. F. Rider; comprises 20 acres of land; schist bedrock; 10 feet of gravel. Idle.

Brazil, in Sec. 11, T. 45 N., R. 7 W., in the Hawkinsville mining district, 3 miles west of Yreka. Owner, A. Brazil; in Klamath Forest Reserve; 80 acres, located in 1856; water from Greenhorn ditch; 10 feet of gravel; slate bedrock; small output.

Bibl.: Report VIII, p. 612; XIII, p. 391.

Buckeye Bar, formerly known as *Jackson,* in Sec. 9, T. 46 N., R. 9 W., in Oak Bar mining district, 26 miles west of Hornbrook. Owners, Jackson Brothers; in Klamath Reserve; bedrock is schist; gravel is 10 feet deep. Idle on account of lack of water; 2 miles of ditch from McKinney Creek; contains 60 acres.

Bibl.: Report VIII, p. 592; XII, p. 279; XIII, p. 391.

Canal Gulch, in Sec. 4, T. 45 N., R. 7 W., in Hawkinsville mining district, 3 miles north of Yreka. Owner, W. Koester; in Klamath Forest Reserve; 20 acres, located in 1876; worked in spring; only little water; 10 feet of gravel; slate bedrock.

Enterprise, in Sec. 16, T. 46 N., R. 9 W., in Oak Bar mining district, 24 miles west of Hornbrook. Owner, R. J. Fenile; in Klamath Forest Reserve; 40 acres of ground; schist bedrock; 10 feet of gravel. Idle.

Indian Bar, in Sec. 30, T. 11 N., R. 7 E., 6 miles northeast of Forks of Salmon in Klamath Forest Reserve. Owners, Ayles & Dunn; comprises 40 acres; schist bedrock; 15 feet of gravel. Idle; only do assessment work.

Bibl.: Report XII, p. 277; XIII, p. 407.

John Miller, in Sec. 3, T. 45 N., R. 7 W., in Hawkinsville mining district, 4 miles north of Yreka. Owner, J. A. Tiexeria; in Klamath Forest Reserve; 40 acres patented; 10 feet of gravel; slate bedrock. Idle for several years.

Bibl.: Report XIII, p. 409.

McKinney Creek, in Sec. 9, T. 46 N., R. 9 W., in Oak Bar Mining district, 26 miles west of Hornbrook. Owners, S. H. and S. R. Crary; in Klamath Forest Reserve; contains 40 acres; schist bedrock; 12 feet of gravel; water from McKinney Creek through a ditch 2½ miles long.

O'Donnell, in Secs. 3, 4 and 10, T. 45 N., R. 7 W., in Hawkinsville mining district, 3 miles north of Yreka. Owner, Mrs. O'Donnell; in Klamath Forest Reserve; 45 acres patented; worked since 1856; slate bedrock; 10 to 20 feet of gravel; small production.

Bibl.: Report XIII, p. 418.

Paine, in Sec. 21, T. 46 N., R. 9 W., 28½ miles west of Hornbrook in the Oak Bar mining district in the Klamath Forest Reserve. Owner, A. A. Paine; schist bedrock; 8 feet of gravel; comprises 20 acres. Idle.

Santana Brothers, in Sec. 11, T. 45 N., R. 7 W., in Hawkinsville mining district, 2½ miles north of Yreka. Owners, Santana Brothers, formerly known as Joe Lemois; 60 acres located in 1856; 7 feet of gravel; slate bedrock; small production. Idle until spring.

Bibl.: Report XIII, p. 424.

Simas & Rose, in Sec. 25, T. 45 N., R. 8 W., in Greenhorn mining district, 4½ miles west of Yreka. Owners, Simas & Rose; in Klamath Forest Reserve; 160 acres patented; located in 1870; 8 feet of gravel; slate bedrock; 2 miles of ditch; season from February to June. Idle.

Sylvester Ramus, in Sec. 11, T. 45 N., R. 7 W., in Hawkinsville mining district, 2½ miles north of Yreka. Owner, S. Ramus: in Klamath Forest Reserve; 87 acres; water from lower Greenhorn ditch, 6 miles long; 5 feet of gravel; slate bedrock. Idle; worked each spring; small output.

Sulphur Springs, in Sec. 18, T. 47 N., R. 7 W., in the Virginia Bar mining district, 7 miles north of Gottville, on Empire Creek in Klamath Forest Reserve. Owner, E. Campbell; comprises 20 acres; schist bedrock; 3 to 5 feet of gravel; only small production in 1912.

Tom Rogers, in Sec. 11, T. 45 N., R. 7 W., in Hawkinsville mining district, 2 miles north of Yreka. Owner, Phillips Brothers; in Klamath Forest Reserve; 113 acres, patented; discovered in 1860; water from Greenhorn Creek; short season. Idle since May; 5 to 10 feet of gravel; slate bedrock.

Bibl.: Report XIII, p. 430.

GOLD MINES—DRIFT.

Allgood & Castell, in Sec. 12, T. 11 N., R. 7 E., in the Liberty mining district, 3 miles southeast of Somes Bar. Owners, Allgood & Castell; comprises 40 acres; slate bedrock; 30 feet of gravel. Idle; some rich gravel worked at one time.

Ascondry, in Sec. 10, T. 46 N., R. 9 W., in Oak Bar mining district, 27 miles west of Hornbrook. Owner, W. Quingley; contains 100 acres; 50-foot shaft; schist bedrock; 8 feet of gravel. Idle.

California Bar, in Sec. 18, T. 46 N., R. 6 W., in the Cottonwood mining district, 9 miles southwest of Hornbrook in Klamath Forest Reserve. Owners, Vene Gold Bar Mining Company; comprises 20 acres on old river bar; bedrock is slate; old shafts caved. Idle at present; water from Klamath River through a ditch 1½ miles long; some good ground.

Bibl.: Report XIII, p. 391.

Consolidated Sciwash, in Sec. 6, T. 44 N., R. 8 W., in the Deadwood mining district, 6 miles north of Fort Jones. Owner, H. Madison; comprises 90 acres, patented, on McAdams Creek; quartz-porphyry bedrock; 30 feet of gravel; 450-foot tunnel, and three 50-foot shafts (all caved); good producer at one time. Idle for a number of years.

Bibl.: Report XIII, p. 395.

Deep Channel, formerly known as *Taylor & Maplesden,* in Sec. 36, T. 46 N., R. 11 W., in the Hamburg Bar mining district, ⅛ mile west of Hamburg Bar in the Klamath Forest Reserve. Owner, Deep Channel Mining Company, of Portland, Oregon; president, J. L. McKittrick; comprises 40 acres on the Klamath River; schist bedrock; gravel is from 20 to 50 feet deep; 100-foot tunnel 5′ x 7′ and 60-foot shaft, 4′ x 6′ (abandoned). Idle during 1913; some good ground and has been a steady producer.

Bibl.: Report XII, p. 293; XIII, p. 429.

Doolittle, in Sec. 5, T. 17 N., R. 8 E., in the Happy Camp mining district, 6 miles northeast of Happy Camp in the Klamath Forest Reserve. Owner, M. Doolittle; comprises 40 acres of patented land along the Klamath River; schist bedrock; 30 feet of gravel; 120-foot tunnel, 5′ x 7′. Idle; producer at one time.

Bibl.: Report XIII, p. 404.

Elk Creek, in Sec. 15, T. 16 N., R. 7 E., in the Happy Camp mining district, 1 mile southwest of Happy Camp in the Klamath Reserve. Owners, Chinese Company; comprises 60 acres along the Klamath River; schist bedrock; 10 to 40 feet of gravel; 220-foot tunnel, 5′ x 7′; paid well at one time. Idle at present.

Bibl.: Report XII, p. 281; XIII, p. 398.

Empire Bar, in Sec. 2, T. 46 N., R. 7 W., in the Virginia Dale mining district, in town of Gottville, in the Klamath Reserve. Owners, an incorporated company; comprises 20 acres, patented; slate bedrock;

5 to 8 feet of gravel; old shafts; small steam hoist; worked by leasers at times, but idle at present; has been a good producer.

Bibl.: Report VIII, p. 589.

Evans, formerly known as the *Berry*, in Sec. 17, T. 8 N., R. 7 E., in the Happy Camp mining district, 5½ miles northeast of Happy Camp in the Klamath Reserve. Owner, C. A. Evans; comprises 20 acres; bedrock is schist, with quartz stringers running through it; depth of gravel is 40 feet; 60 feet tunnel, 5′ x 7′ feet; only do assessment work; small producer at one time.

Everill, in Sec. 26, T. 46 N., R. 11 W., in Hamburg Bar mining district, 4 miles southwest of Hamburg Bar. Owner, J. H. Everill; comprises 40 acres on the Klamath River; bedrock is slate; 120-foot tunnel on bedrock; old 60-foot shaft; equipment: dwelling, derrick, pipe, sluice boxes; good ground; leased to an incorporated company; T. C. Williams, superintendent; three men employed.

Bibl.: Report XII, p. 281; XIII, p. 400.

French Bar Placer, in Sec. 17, T. 46 N., R. 10 W., in the Scott River mining district, ½ mile northwest of Scott Bar, in the Klamath Forest Reserve. Owner, Z. E. Russell; comprises 20 acres, on Scott River; slate bedrock; 20 feet of gravel; 40-foot tunnel, 5′ x 7′; only do assessment work.

Gold Lead, in Sec. 8, T. 45 N., R. 10 W., in the Scott River mining district, 1¼ miles north of Scott Bar in the Klamath Reserve. Owner, M. Andrews; comprises 20 acres on the Scott River; slate bedrock; 10 to 20 feet of gravel; water from Tom Creek through 1 mile of ditch; 90 feet tunnel (5′ x 7′), on bedrock; equipment: car, blacksmith shop, mining tools; one man employed at $3 per day; production generally about $4000 (five months run); some coarse gold found on the bedrock; easy ground to work.

Klamath River Gold Mining Company, in Sec. 15, T. 46 N., R. 7 W., in the Cottonwood mining district, 12 miles southwest of Hornbrook in Klamath Forest Reserve. Owners, Klamath River Gold Mining Company; comprises 20 acres on old bar of Klamath River; bedrock is slate; gravel 5 to 20 feet deep; old shafts to bedrock; company spent considerable money without any return. Idle.

Lucky Bob, in Sec. 2, T. 46 N., R. 7 W., in the Virginia Dale mining district, in town of Gottville. Owners, Freshour Brothers; comprises 40 acres, being a bench and bar along the Klamath River; slate bedrock; 7 feet of gravel; old shafts from 30 to 50 feet deep; good producer years ago; worked by leasers at times, but idle at present.

Bibl.: Report XII, p. 287; XIII, p. 413.

McMahon, in Sec. 25, T. 40 N., R. 9 W., in the Callahan mining district, 3 miles southeast of Callahan in the Klamath Reserve. Owner, C. A. Crowley; comprises 40 acres, on the Scott River; schist bedrock; good pay in the soft spots; 150-foot tunnel; old 40-foot shaft (caved); worked a little during the winter; small producer.

Bibl.: Report XII, p. 287; XIII, p. 415.

Miller, in Sec. 34, T. 44 N., R. 9 W., in the Callahan mining district, 5 miles southeast of Callahan in the Klamath Reserve. Owners, Jackson & Biedenbeck; comprises 20 acres; schist bedrock; 40 feet of gravel; 2 tunnels 100 and 60 feet in length on the bedrock; water from Jackson Creek through ½ mile of flume; no production since 1911; some good ground.

Bibl. Report XIII, p. 415.

Montezuma, in Sec. 20, T. 40 N., R. 8 W., in the Callahan mining district, in town of Callahan in the Klamath Reserve. Owner, Hop-yick; comprises 20 acres on the Scott River; schist bedrock; 20 to 50 feet of gravel; Chinese working over an old dump; noted producer years ago; best ground worked out.

Bibl.: Report VIII, p. 612; XII, p. 288; XIII, p. 416.

Paradise Flat, in Sec. 29, T. 40 N., R. 11 W., in the Liberty mining district, ⅛ mile west of Sawyer's Bar in the Klamath Reserve. Owner, A. Meyers; comprises 40 acres, patented, along the North Fork of the Salmon River; slate bedrock; 10 to 50 feet of gravel; old bench; 1000-foot tunnel; only worked on a small scale; said to have produced $140,000; seems to be a second bench, carrying good pay.

Poverty Point, in Sec. 18, T. 46 N., R. 9 W., in the Oak Bar mining district, 32 miles west of Hornbrook on Klamath River. Owner, H. H. Barton; 200 acres (40 acres patented); located in 1876; in Klamath Reserve; country rock, schist and diorite; 20 feet of gravel; 2400-foot tunnel (caved); produced $23,000. Idle for ten years.

Bibl.: Report VIII, p. 592; XIII, p. 420.

Schuler, in Sec. 16, T. 45 N., R. 10 W., in the Scott River mining district in the town of Scott Bar in the Klamath Reserve. Owner, M. Schuler; comprises 20 acres on Scott River; slate bedrock; 20 to 30 feet of gravel; 60 feet tunnel in river bank; only do assessment work; some rich ground worked at one time.

Bibl.: Report XIII, p. 425.

Sugar Hill, in Sec. 20, T. 40 N., R. 8 W., in the Callahan mining district, 5 miles southwest of Callahan in the Klamath Reserve. Owner, G. W. Smith; comprises 40 acres on Fox Creek; schist bedrock, coarse gold being found in crevices in this bedrock; 320-foot tunnel, 40-foot shaft (caved); 20 to 40 feet of gravel, loose. Idle; only do assessment work; some good pay extracted years ago.

Bibl.: Report VIII, p. 611.

Whistle Bar, formerly known as the *Blake,* in Sec. 29, T. 40 N., R. 11 W., in the Liberty mining district, at Sawyer's Bar in the Klamath Forest Reserve. Owner, E. Curran; comprises 20 acres on the North Fork of the Salmon River; slate bedrock; 30 to 100 feet of gravel, loose; 400-foot tunnel, 3′ x 7′; good producer at one time. Idle at present; only do assessment work; about one half of the gravel has been worked.

Bibl.: Report VIII, p. 616.

Wilson, in Sec. 29, T. 44 N., R. 8 W., in the Deadwood mining district, 8½ miles north of Fort Jones. Owner, F. L. Wilson; comprises 40 acres on Deadwood Creek; quartz-porphyry bedrock; 30 feet of gravel; water from Deadwood Creek through ½-mile of ditch; 320 feet bedrock tunnel and 50-foot shaft (caved); best ground has been worked; only do assessment work.

Bibl.: Report XIII, p. 432.

GOLD DREDGING.

Only one dredge in operation in Siskiyou County during the year 1913. This boat, owned by the Siskiyou Dredging Company, is working on McAdams Creek, some 5 miles north of the town of Fort Jones.

The Scott River Dredging Company operated a dredge on the Scott River near Callahan during 1908 and 1909. The project was finally abandoned and the machinery sold to the Trinity Dredging Company, and hauled to Trinity Center, Trinity County, where it was installed.

Bibl.: Bull. No. 57, p. 221.

The Northern California Dredge Company, owning several acres of land along the Klamath River in Sec. 36, T. 46 N., R. 11 W., M. D. M., about ½ mile west of Hamburg Bar, endeavored to work their land by means of a suction dredge, which proved a failure. The dredge has been idle since 1911.

Siskiyou Dredging Company, in Secs. 14, 6 and 35, T. 44 and 43 N., R. 8 and 9 W., in the Deadwood mining district, 5 miles north of Fort Jones, is the only dredge in operation in Siskiyou County. It is owned by the Siskiyou Dredging Company; G. J. Carr, president; J. C. Osgood, secretary; J. W. Boles, superintendent; home office is in San Francisco; comprises an area of 165.5 acres on McAdams Creek, 120 of which are patented, and includes the old Oak Grove, Diggles, Mathewson and

Shaw drift claims; course of the channel is north and south; quartz-porphyry bedrock; 30 to 60 feet of gravel, loose and easily removed; 2 miles of flume from McAdams Creek for water for floating dredge during the summer season; $5\frac{1}{2}$ cu. ft. Bucyrus type dredge with 98-foot digging ladder, and will handle gravel to a depth of 50 feet below the water level, and has a capacity of 2000 cubic yards per day or 154 yards per hour; 10 miles of power line; electricity from California-Oregon Power Company, costing $1\frac{1}{10}$ cents per cubic yard; ten men are employed; total operating cost per cubic yard is 6 cents; property acquired in 1909, and dredge has been operating since 1910; good dividends declared; about 20 acres have been worked.

Bibl.: Bull. No. 57, p. 223.

GRANITE.

The greater portion of the granite in Siskiyou County is too much shattered to be used for monument or building purposes. There is a large body of granite, however, on Craggy Mountain, T. 41 N., R. 8 W., from which some good building blocks have been obtained. Another deposit, southeast of Etna on Mill Creek in Sec. 1, T. 41 N., R. 9 W., contains some fine-grained stone that has been used for monument work. A similar grade of granite is found in the southwest and southeast corners of T. 40 N., R. 8 and 9 W.

Bibl.: Bull. No. 38, p. 54.

IRON.

Iron float is found in Sec. 10, T. 46 N., R. 10 W., on the north side of the divide between Buckhorn Creek and the Klamath River.

Bibl.: Bull. No. 38, p. 304.

LIMESTONE.

Two limestone deposits, one northeast of Greenview and the other southwest of Callahan, have been worked and the material has been converted into lime.

Bibl.: Bull. No. 38, pp. 92–93.

Burton, in Sec. 17, T. 43 N., R. 9 W., in the Oro Fino mining district, 4 miles northeast of Greenview. Owned by T. Martin; comprises 40 acres, discovered in 1889; large limestone deposit having a width of 1000 feet, but only 15 feet thick; limestone burned in kiln made of rocks, having the arch-shape form; capacity of kiln, 6 tons in five days; good grade of limestone; product produced upon demand.

Farrington, in Sec. 24, T. 40 N., R. 9 W., in the Callahan mining district, $2\frac{1}{2}$ miles southwest of Callahan. Owned by S. Farrington; comprises 20 acres, located in 1873; massive deposit of limestone; the

Photo No. 5. Marble Mountain, Siskiyou County.

extent not determined; surface stripped and limestone extracted from open cuts and burned in a small kiln of a capacity of 10 tons in four days; product is of splendid quality and was used in the hotel at Callahan; very little demand for the product. Idle.

Bibl.: Bull. No. 38, pp. 92–93.

MACADAM.

Steele Quarry, in Sec. 27, T. 45 N., R. 7 W., $\frac{3}{4}$ mile southeast of Yreka. Owned by J. M. Steele; comprises 100 acres, located in 1896; deposit just being opened up and its extent not determined as yet; plant consists of a crusher, operated by gasoline, cars, and mining tools; five men are employed; rock used on streets in Yreka.

MARBLE.

A belt of marble runs from a short distance west of Etna Mills, in a northwest direction along the eastern slope of the Salmon Mountains, forming, farther north, part of the Marble Mountains, and in the Grider Mountains showing north of the Klamath River on Thompson Creek, and running farther north into Oregon.

Bibl.: Report XIII, p. 632; Bull. No. 38, pp. 107-108.

Marble Mountain, a very large belt in Secs. 16, 19, 20 and 21, T. 43 N., R. 10 W., M. D. M., is a noted landmark; the limestone is metamorphosed, producing all varieties and colors of marble, but principally pure white. (See photo No. 5.)

Bibl.: Bull. No. 38, p. 107.

Barton & Barham, in Sec. 18, T. 46 N., R. 9 W., in the Oak Bar mining district; owned by Barton et al.; comprises 160 acres, located in 1913; massive deposit in schist; no work done on claims; marble is of the clouded variety, showing black streaks and probably of no commercial value.

Bibl.: Report XIII, p. 632.

Luce, in Sec. 41, T. 41 N., R. 8 W., in the Deadwood mining district, 3 miles north of Fort Jones. Owner, A. H. Luce; comprises 160 acres, patented, located in 1907; dike in schist, 300 feet wide and can be traced for 1500 feet, and is of good quality, taking a fine polish and easily worked; only small amount extracted from shallow cuts. Idle at present.

McDaniels, in Sec. 6, T. 41 N., R. 9 W., M. D. M., on road from Etna to Sawyer's Bar. Owned by R. McDaniels of Etna; seams of diabase through the marble and body of pure white marble much smaller than in the Parker deposit.

Bibl.: Report XIII, p. 632; Bull. No. 38, p. 107.

Parker, in Sec. 32, T. 42 N., R. 9 W., near Etna. Owned by A. Parker, Jr.; belt from 100 to 200 feet wide at elevation of 4000 feet; marble heavily bedded, in places being perfectly white and fine-grained, while in other places it is pink-colored and very coarsely crystalline; worked to a limited extent.

Bibl.: Bull. No. 38, p. 107.

Thompson Creek, in Sec. 8, T. 17 N., R. 8 E., H. M., in the Happy Camp mining district, 8½ miles northeast of Happy Camp on Thompson Creek. Owner, J. C. Wood; comprises 40 acres, located in 1890; large massive beds in schist and serpentine, few open cuts, so that extent of marble deposit not determined; it is hard and takes a good polish; the crystals are large, white and translucent. Idle.

Bibl.: Report XIII, p. 632.

MINERAL WATER.

Shasta Springs, on the Oregon branch of the Southern Pacific Railroad in Sec. 12, T. 39 N., R. 3 W., are owned by the Shasta Springs Mineral Water Company, and the only water from Siskiyou County on the market. These springs were first brought to notice during the construction of the railroad in 1887.

The three springs—Shasta, Glacier and Keystone—are all about 300 feet apart. The water has a temperature of 51° F., and contains considerable carbonic acid gas, magnesium, potassium, iron, and a little manganese, lithium and arsenate. The bedrock is tufa, overlaid with doleritic lava. The equipment consists of bottling works and dwellings.

Bibl.: Report XI, pp. 449–451; Mineral Springs of California, Anderson, p. 244.

Upper Soda Springs, in Sec. 24, T. 39 N., R. 4 W., 2 miles north of Dunsmuir. Owned by George McCloud; water is heavily charged with carbonic acid gas; formation is similar to the Shasta Springs section; water not on the market.

Bibl.: Report XI, p. 452; Mineral Springs of California, Anderson, p. 260.

Scott Springs, in Sec. 7, T. 39 N., R. 3 W., 3 miles north of Dunsmuir; water and formation similar to Shasta Springs. Owned by J. J. Scott & Company.

Bibl.: Report XI, p. 452.

Castle Crag Soda Springs, at Castle Crag. Owned by Pacific Improvement Company; water has a temperature of 53° F., and contains sodium, potassium, magnesium, calcium, with a trace of iron, silicia, alumina, manganese, barium, lithium, borates, ammonium carbonate; it is a well known summer resort.

Klamath Hot Springs, in Sec. 27, T. 48 N., R. 3 W., at Klamath Springs. Owned by Edson Estate; claimed good for rheumatism and blood diseases; several dwellings on the property.

Bibl.: Mineral Springs of California, Anderson, p. 183.

Siskiyou Mineral, in Secs. 33 and 34, T. 48 N., R. 9 W., 14 miles northwest of Walker. Owned by J. Garreston; water contains considerable iron and magnesia, and said to be good for blood diseases; conducted as a summer resort; several dwellings on the property.

Bibl.: Report XIII, p. 521.

Warmcastle Soda Springs, in Sec. 13, T. 39 N., R. 3 W., 1 mile south of Nabar. Owned by Estate of Judge Warmcastle; elevation is 3000 feet; water contains considerable soda.

ORNAMENTAL STONES.

Vesuvianite is found on the South Fork of Indian Creek, 12 miles north of Happy Camp, on land owned by Dr. A. E. Heighway; discovered in 1901; outcrops for 300 feet along the hillside, above the creek, and large masses have fallen into the bed of the creek below. It is a hard and handsome stone, olive to green in color, and takes a fine polish. The associated rock is serpentine; the rich translucent green color, fine-grained sub-splintery fracture and brilliant luster, when polished, strongly suggest jade, and many have called it by that name; deposit has not been worked. This variety of vesuvianite is also known as *californite.* F. H. Dakin of San Francisco also has claims covering portions of the deposit.

Bibl.: Bull. No. 37, pp. 93–94; Bull. No. 67, pp. 125–126.

Brusse, in Sec. 34, T. 17 N., R. 7 E., in the Happy Camp mining district, 3 miles north of Happy Camp on Indian Creek. Owned by F. A. Brusse; discovered in 1899; not in place, but pieces of float weighing several pounds found along the creek; associated with serpentine; resembles the Heighway mineral.

Griffin Onyx Quarries are situated 6 miles south of Berryvale. Specimens in the State Mining Bureau are 7355 and 8969.

Bibl.: Bull. 37, p. 112.

PLATINUM.

Small amounts of platinum are obtained with the gold in some of the placer mines of Siskiyou County, particularly on the streams traversing serpentine areas.

QUICKSILVER.

A cinnabar deposit in the northern part of the county on the headwaters of the West Fork of Beaver Creek above Oak Bar has been worked to some extent by the Siskiyou Quicksilver Mining Company. There is another small deposit on Horse Creek, which has not developed at all.

The holdings of the *Siskiyou Quicksilver Mining Company,* of San Francisco, comprise several acres on the headwaters of the West Fork of Beaver Creek, some 15 miles west of Cole's Station. The development consists of several hundred feet of tunnelling and drifts. The reduction plant consists of a 10-ton furnace. Idle for some time; had a small production.

Bibl.: Report XII, p. 370; XIII, p. 602; Bull. 27, p. 196.

Barton & Lange, in Sec. 22, T. 46 N., R. 9 W., in the Klamath Reserve, 4 miles west of Oak Bar in the Oak Bar mining district. Owners, Barton & Lange; comprises 60 acres of patented land, located in 1890; massive dike with no definite strike or dip; the country rock (schist and diorite), impregnated with cinnabar; deposit 160 feet wide and can be traced 2000 feet; short tunnel and open cuts comprise the workings; a few pounds (selected) of the semi-transparent crystals of cinnabar sold to Chinese for $4 per pound, to be used in paints and for medicinal purposes. Idle several years.

Bibl.: Report XIII, p. 602. Bull. No. 27, p. 196.

SANDSTONE.

A very extensive bed of sandstone runs along the east side of the Kildal Hills, Black Mountain Range, and Cottonwood Mountains, into Oregon; also found east of Yreka in two large exposures. It forms the rim of the Shasta Valley, having a northeast direction in Sec. 13, T. 45 N., R. 7 W., and also crops out a few miles south of Ager on the Herr ranch, where coal is found. Same belt exposed in the vicinity of Hornbrook in the ridges surrounding the valleys of the Klamath River and the lower part of Cottonwood Creek. A belt of fine-grained sandstone about $\frac{1}{4}$ mile in width west of Hornbrook along the rim of Cottonwood Creek forms a landmark, as its surface sloping east comprises the bare lower slope of the mountains, its gray color being distinguishable from a long distance; it is very fine grained, compact and hard, consisting of small granules of quartz, intermixed with some small ones of hornblende.

Bibl.: Bull. 38, pp. 139–140.

Antone, formerly known as the Weeks Quarry, in Sec. 2, T. 45 N., R. 7 W., 2 miles northeast of Yreka. Owned by Mrs. C. Antone; comprises 160 acres, patented, at an elevation of 2700 feet; occurs in stratified layers from 6 inches to 8 feet thick, and these sheets are pried from the deposit by hand; very little blasting needed; equipment at quarry consists of derrick of 2400 pounds capacity and mining tools; three men employed; stone of good quality, and has been used since 1860; new high school and other buildings in Yreka constructed with this stone; also used for tombstones; leased to J. P. Russell.

Fiock Bros. Quarry, in Sec. 13, T. 45 N., R. 7 W., near Yreka; considerable stone removed; face of the quarry shows massive sandstone, nearly horizontal, dipping slightly east; upper bed is 10 feet thick, coarse grained; of a very uniform texture, and tawny in color.

Bibl.: Bull. No. 38, p. 140.

Southern Pacific Railroad Company owns several quarries in Sec. 29, T. 47 N., R. 6 W., near Hornbrook; stone breaks in large blocks, some weighing 4 to 5 tons; quarries worked by plug and feather method; sandstone used in construction of Jones & Horn buildings in Hornbrook, built in 1888 and shows no signs of weathering.

Bibl.: Bull. No. 38, p. 140.

SOAPSTONE.

Talc is a hydrous silicate of magnesia (4 MgO, 5 SiO_2, H_2O) that occurs in different varieties, of which soapstone is one of the most important.

Soapstone is more compact and harder than talc and is used in the manufacture of many articles, such as bath and laundry tubs, switchboards for electrical plants, sinks, griddles and many other articles.

Talc is used as a powder, or flour talc, and as pieces sawed into various sizes and shapes. The flour talc is used in fireproof paints, electric insulators, boiler and steam pipe coverings, toilet powder, in the manufacture of powder and other articles.

Soapstone is found in several places in Siskiyou County, a large expose being noted in the northeast sections of T. 45 N., R. 11 W., southeast of Hamburg Bar, having a course of N. 50° E. and can be traced toward the ridge west of Scott River and is 50 feet wide; it is of good quality and resists the effect of fire for years in fireplaces; also used in sheets $\frac{1}{2}$ to $\frac{3}{4}$ of an inch thick for stove backs. There is another large belt south of Marble Mountain, in T. 13 N., R. 8 E., H. M., near the head of Wolley Creek.

Bibl.: Bull. No. 38, p. 352.

Talc is found in the Cottonwood Mountains, 30 feet wide, on the top of the divide between Beaver and Bumblebee creeks; it has no grit and the iron content gives it a light ochreous color; located by E. Caldwell of Hamburg Bar. A small exposure is found near Etna, in Sec. 32, T. 42 N., R. 9 W. Owned by J. Conners; it occurs in a serpentine belt and has no grit.

Bibl.: Bull. No. 38, p. 353.

SISKIYOU COUNTY.

Bibliography.

Publications issued by California State Mining Bureau.

	Pages
Report II	47, 184–187, 189.
Report IV	32, 73, 99, 115, 137, 310.
Report V	67, 112.
Report VI (Part I)	93, 96, 101, 118, Part II, pages 63, 187.
Report VIII	14, 24, 581–631.
Report IX	31, 262, 318, 319.
Report X	655–658.
Report XI	420–449.
Report XII	61, 275–294, 346, 370, 464–471.
Report XIII	34, 55, 64, 386–435, 520, 521, 632.

	Pages
Bulletin No. 27	196.
Bulletin No. 37	93, 94, 112, 155.
Bulletin No. 38	54, 106, 107, 112, 113, 139, 140, 148, 230, 257, 258, 264, 272, 280, 346–348, 352–354, 360, 362, 363, 366–372.
Bulletin No. 50	120–133.
Bulletin No. 57	218–223.
Bulletin No. 67	8, 18, 19, 21, 29, 42, 67, 69, 70, 76, 78, 80, 82, 85, 110, 115, 123, 124, 127, 152, 180.

Register of mines and map of Siskiyou County.
Publications by U. S. Government, U. S. Geological Survey.
Mineral Resources of United States:

Year	Pages
1903	173, 175, 176.
1904	165, 166, 168, 173, 177.
1905	164–169, 172, 182–184.
1906	178–185, 196, 197.
1907 (Part I)	189–194, 196, 198, 199, 226–228.
1908 (Part I)	316, 318–321, 324–325, 347, 349–353.
1909 (Part I)	261–265, 268, 269, 285, 286.
1910 (Part I)	349, 350, 352–354, 358, 359, 378, 379.
1911 (Part I)	465, 466, 468–470, 473–476, 500, 501.
1912 (Part I)	571, 572, 574–577, 584–586, 599, 602, 616, 630.

Mineral Resources West of the Rocky Mountains.

TRINITY COUNTY.

Field Work in October, 1913.

INTRODUCTION.

Trinity County, with an area of 3000 square miles, is bounded on the north by Siskiyou, on the east by Shasta and Tehama, on the south by Mendocino, and on the west by Humboldt County, and is drained by the Trinity, Mad, Eel and Van Dusen rivers.

Trinity is a mountainous county, its eastern third being covered by the Coast Range, or Trinity Mountains, the summit of which divides it from Tehama and Shasta counties. The mountain ranges of Scott and Salmon on the north form the boundary between it and Siskiyou. Bully Choop, Baldy and other peaks in the Trinity and Salmon Mountain ranges reach an altitude of over 6000 feet. The hydrography of this county is very simple, the Trinity River and its confluents draining all parts of it. This river, heading in the Scott Mountain division of the Coast Range, after flowing south for 60 miles, makes a detour to the northwest, which course it holds for another 60 miles, and unites with the Klamath River, in Humboldt County. From the section where Coffee Creek, one of the tributaries, flows into the Trinity, the great banks of auriferous gravel commence, parallel with the present river as far as Swift Creek, in Sec. 9, T. 36 N., R. 7 W. The river formerly flowed west of the town of Trinity Center, at an elevation of several hundred feet above its present channel, thence taking a southwesterly course through the Buckeye Range (T. 34 N., R. 9 W.), on to Weaver Basin.

Through this section, Trinity Center to Weaver Basin, is presented the only evidence of ancient river channels, the ancient river emptying into a great lake at the present Weaver Basin. The material filling this channel is composed of volcanic breccia and rocks of all formations and ages—angular, irregular, rounded and intermingled with conglomerates, clay and sands.

The bed of Weaver Basin is a cement, several hundred feet in thickness below the auriferous gravel, deposited from the ferruginous, siliceous and calcareous matter carried down by the waters, erosions of the various formations along the channel settling in the basin, and there cementing. The absence of coarse material leads to the hypothesis that this cementation took place prior to the filling of the cement channel with auriferous sands and gravel.

Bibl.: Bull. No. 540, pp. 16–18, U. S. G. S.

GEOLOGY.

Scott Mountain, formed of igneous, volcanic rocks, with its showing of basalts, trachyte, and obsidian, overlaps the granite as shown in the Salmon Range to the west, its gray peaks towering above the timber line into the region of perpetual snow. On the east is the Trinity Range of granite, syenites, diabase and porphyries. Farther south on the range are metamorphic gneiss, hornblende and mica schists, then a slate belt, followed by a large belt of serpentine crossing in T. 38 N., R. 5 W.

HISTORY.

The first discovery of mineral in this county is attributed to Major Redding, in 1848, who prospected the Trinity River near Redding Creek (T. 32 N., R. 10 W.), and following his discovery came the prospectors from all sections, working the river bars, the ravines and gulches, extracting the gold from the gravel and sands by the rocker, tom and sluice. The evidence of these early workings can be seen along the course of almost every streamlet, creek, gulch and ravine tributary to the Trinity.

MINING CONDITIONS.

While Trinity County is lacking in railway facilities, the abundance of timber and water overcomes this handicap to a large extent.

Gold mining has been the principal industry for over fifty years, the placers giving Trinity County its wealth, and there are still many hundreds of acres of auriferous gravel awaiting exploration. Dredge mining is being successfully pursued at Trinity Center and Lewiston, and large areas in both these districts have recently been prospected for their dredging possibilities.

The La Grange, the largest active hydraulic mine in the world, is in this county.

Quartz mining is still in its infancy; quartz veins, carrying gold, are being prospected and worked in different sections; others that have been operated for several years have yielded and some are still yielding handsome returns to the owners; Dedrick, and the North and East Forks are the most active quartz districts at the present time, due to the installing of machinery and the development work on the Globe and Craig mines in the former section, and to the number of prospects being opened up in the North and East Fork territory.

The Brown Bear is the best known quartz mine in the county, and at one time was the largest producer.

MINERAL RESOURCES.

Its mineral resources consist of gold, silver, platinum, quicksilver, chromic iron, coal, copper, building stone and asbestos. The government records show a total mineral production of $150,000,000. Mineral production of Trinity County, from 1894 to 1913, inclusive, from records of California State Mining Bureau are as follows:

Substances	1894	1895	1896
Gold	$1,012,665 84	$1,166,745 13	$1,296,330 30
Silver	325 00	1,257 28	
Granite	5,000 00		
Quicksilver		137,410 00	139,035 00
Totals	$1,017,990 84	$1,305,412 41	$1,435,365 30

Substances	1897	1898	1899
Gold	$1,078,372 00	$859,255 00	$590,510 00
Silver	259 00	314 00	1,086 00
Quicksilver	29,330 00	151,200 00	123,624 00
Granite			375 00
Totals	$1,107,961 00	$1,010,769 00	$715,595 00

Substances	1900	1901	1902
Gold	$571,605 00	$684,683 00	$719,992 00
Silver	16,567 00	2,668 00	550 00
Quicksilver	105,982 00	58,668 00	10,251 00
Granite	4,535 00	5,500 00	
Copper		761 00	
Platinum			468 00
Totals	$698,689 00	$752,280 00	$731,261 00

Substances	1903	1904	1905
Gold	$607,728 00	$574,814 00	$690,844 00
Silver	2,085 00	135 00	3,044 00
Quicksilver	11,056 00	3,864 00	13,917 00
Granite	75 00		
Copper			
Platinum	200 00	275 00	
Totals	$621,244 00	$579,088 00	$708,255 00

Substances	1906	1907	1908
Gold	$560,843 00	$535,316 00	$602,944 00
Silver	2,981 00	2,399 00	4,269 00
Quicksilver	6,059 00	3,739 00	3,804 00
Granite			
Copper			
Platinum	130 00		
Totals	$570,013 00	$541,454 00	$611,017 00

Substances	1909	1910	1911
Gold	$520,046 00	$500,851 00	$612,149 00
Silver	2,302 00	1,960 00	6,777 00
Quicksilver	7,915 00	5,622 00	2,024 00
Granite			
Stone industry			
Copper			
Unapportioned, 1900-1909 (inc.)	111,307 00		
Totals	$641,570 00	$508,433 00	$620,950 00

Substances	1912	1913
Gold	$723,503 00	$431,862 00
Quicksilver	7,494 00	161 00
Silver	758 00	2,119 00
Stone industry	2,000 00	1,000 00
Totals	$733,755 00	$435,142 00

ELECTRICAL POWER PLANTS.

Humboldt Gas & Electric Company, with its generating plants about one mile northwest of Junction City, on the Trinity River, serves the territory on its line between this town and Eureka, Humboldt County.

Trinity Gold Mining & Reduction Company has a 700 horsepower plant on Coffee Creek and supplies power to the Alta Bert Dredging Company, and to its own property, the Headlight Mine, near Trinity Center.

Trinity Gold Dredge Company, with a 1500 horsepower plant, on Stewart's Fork, supplies power for operating its dredge at Lewiston.

The Bonanza King, generating plant, on the south fork of the Trinity River, supplies electricity for the mine and for the town of Trinity Center.

ASBESTOS.

Surface exposures of asbestos exist in the vicinity of Trinity Center, Weaverville, and Douglas City, but no work has been done on these deposits to determine their extent or commercial value. It is claimed that a promising deposit was uncovered some twenty-five years ago in constructing the Blythe ditch, in Sec. 28, T. 38 N., R. 6 W., but this ditch is now filled with débris and practically no indications of asbestos can be found.

Bibl.: Bull. No. 38, pp. 264, 360.

The *Trinity Asbestos Mining Company* is opening up a deposit of asbestos on a group of claims near the southern line of the county, and 25 miles from Castella.

CHROMITE.

Chromite is a black ore with a submetallic luster and in appearance resembles some of the iron ores. It occurs in small octahedral crystals and granular masses in serpentine rock, and consists, when pure, of 68% of chromium oxide and 32% of iron oxide; the commercial ores commonly run about 50% of chromium oxide and are generally sold on a 50% basis. It is a source of the chromium salts of commerce and is also used in the manufacture of chrome steel, in basic bricks, and in copper smelting. The quantity of this ore in California far exceeds the demand, the production value in 1912 being $11,260, from 1270 tons, reported from Shasta, Siskiyou and Fresno counties.

A fair grade of chromite is found in Trinity County on the north fork of the east fork of the Trinity River, in T. 38 N., R. 6 W., M. D. M. Another deposit is said to exist near Hay Fork, upon which some development work has been done.

Bibl.: Bull. No. 38, pp. 272, 363, 375.

COAL.

Hay Fork Valley Coal Field. Coal crops out in the bed of Hay Fork River in two points, one in Sec. 12, T. 31 N., R. 12 W., near the town of Hay Fork, and the other in Sec. 7, T. 31 N., R. 11 W., about two miles east of the town. The upper cropping near the town contains two veins of coal, each two feet thick, greatly weathered on the whole, yet in some places a tough black lignite is observed; dip 24° E. Sandstone forms the roof and footwall; deposit can be easily worked. This vein again outcrops in the hills north of the town.

Hyampom Valley Coal Field extends over a large area, the best indications being observed in Secs. 23, 24 and 25, T. 3 N., R. 6 E., H. M. These croppings, near the mouth of the Hay Fork of the Trinity River, are from 3 to 15 feet thick and dip at low angles eastward. Above the coal lies 8 inches of hard blue shale, 14 inches of sandstone, 22 feet of brown shale, and next gravel and soil to the surface. As no development work has been done, the commercial value of this deposit can not be stated.

Poison Camp Field. The croppings of coal are observed in Secs. 15 and 22, T. 2 S., R. 6 E., H. M. The vein is 3 feet thick and dips 24° E.; coal is very young, true lignite, tough and hard and resembles ebony wood; it has a dull brown-black color when split parallel to the fiber and glistening black when broken across the fiber. The coal is of good quality, as it runs high in carbon and low in ash, but the sand roof is so soft that mining would be difficult, unless it changes to a harder sandstone on driving under the hill. The analysis of this coal by Mathyas is as follows: Ash reddish-white color; no coking qualities; water 10.50; volatile matter 38.65; fixed carbon 24.15; ash 26.70.

Coal also outcrops in Sec. 6, T. 33 N., R. 12 W., near Big Bar; it is 2 feet thick, and similar in color and quality to the Hyampom Valley deposit; no development work performed.

Bibl.: Report X, p. 716; XII, pp. 62–63; XIII, p. 56.

COPPER.

The copper prospects of Trinity County are more widely scattered than those of any other county in northern California. They may be grouped in three belts, all of which are essentially areas of peridotite; New River, South Fork (territory lying to the east of the south fork of Trinity River, between Hyampom Valley and Rattlesnake Creek), and Trinity Center, near Carrville, and along the main branch of the Trinity River. Few of the prospects are of very great magnitude, and most of them are too inaccessible for present economical working. Some of the prospects contain ore of high grade and a few shipments have been made.

The expense of working these prespects is apparent when the ordinary freight rate of $15 per ton, from Weaverville or Trinity Center to Redding is considered, while the added cost from the prospects to these points is often large. In spite, therefore, of the natural advantages of timber and water power, copper mining in Trinity County has not yet progressed very far.

Bibl.: Report X, p. 716; XIII, p. 164; Bull. No. 50, pp. 140–146.

Bear Tooth, in the New River mining district; Quimby post office, eight claims on the east side of New River, at an elevation of 2600 feet in Trinity Reserve. Owners, Bear Tooth Mining Company, F. P. Burris, president; four parallel veins, from 1 to 4 feet wide; footwall in gabbro; hanging-wall is serpentine; 3 tunnels, upper 110 feet long, middle 300 feet, lower 125 feet in length; lower 400 feet below upper, has a length of 120 feet; ore consists of sulphide of iron and copper; and in upper part of the vein the ore is oxidized and shows free gold in panning; 8-ton Huntington mill. Idle at present.

Bibl.: Bull. No. 50, p. 144.

Black Palangus, in Sec. 36, T. 1 N., R. 6 E., H. M. Owners Hutchens Brothers. Open cuts; croppings are bold and 20 feet wide; some of the ore, sulphide of iron and copper, assays 17% copper. Idle.

Cinderella, in Sec. 9, T. 37 N., R. 7 W., M. D. M., in Trinity Center mining district. Owners, P. A. and E. A. Wagner, of Carrville. Comprises 2 claims; 300 feet of tunnels and 50-foot shaft; vein said to be 16 feet wide and to carry 10% copper; serpentine is the country rock; joins Copper Queen on the north.

Copper Button, in Sec. 36, T. 37 N., R. 7 W., in the Trinity mining district. Owners, Osborne & Baker. Comprises 4 claims; developed by short tunnels and open cuts; ore, which is high-grade, occurs in connection with dikes of quartz-porphyry in serpentine, and consists of oxides, carbonates and sulphides. Idle.

Bibl.: Bull. No. 50, p. 145.

Copper Queen, in Sec. 16, T. 37 N., R. 7 W., in the Trinity Center mining district. Leased to G. H. Fitch. Comprises 3 claims; short tunnels and shaft; ore occurs in serpentine and consists of oxides and carbonates of copper, with a little sulphide at the lower levels.

Bibl.: Bull. No. 50, pp. 145–146.

Copper Queen, in Secs. 10 and 11, T. 1 S., R. 6 E., H. M., 35 miles southeast of Bridgeville, Humboldt County. Owner, J. Hutchens. Comprises 6 claims; developed by a 40-foot tunnel and open cuts; ore consists of sulphide of iron and copper; strong gossan croppings. Idle.

Crown Point, in Sec. 18, T. 37 N., R. 7 W., in Trinity Center mining district. Owner, G. L. Carr, of Carrville. Ore body is wide and extensive; short tunnel and open cuts. Idle.

Bibl.: Bull. No. 50, p. 145.

Eureka, in Secs. 17 and 18, T. 37 N., R. 7 W., in the Trinity Center mining district. Owners, Dimmock & Hoefler, of Carrville. Comprises 2 claims; 50-foot tunnel; siliceous ore carrying a small percentage of copper sulphide. Idle.

Fortuna, in T. 1 S., R. 6 E., near the Copper Queen. Owner, Fortuna Mining Company, of Fortuna, Cal., C. Sweet, president. Holdings consist of 19 claims, about 30 miles from Bridgeville. Only slightly developed with open cuts and short tunnels. Conspicuous gossan croppings on claims. Ore is a sulphide of iron and copper. Idle.

Granite, on Quimby Creek, 6 miles above its mouth, in Trinity Reserve. Owners, F. C. Patton et al., of Weaverville; 7 claims; ore occurs in serpentine and slate; some of the ore carries 25% copper, with some gold; only little development work; facilities for mining are good.

Bibl.: Bull. No. 50, p. 143.

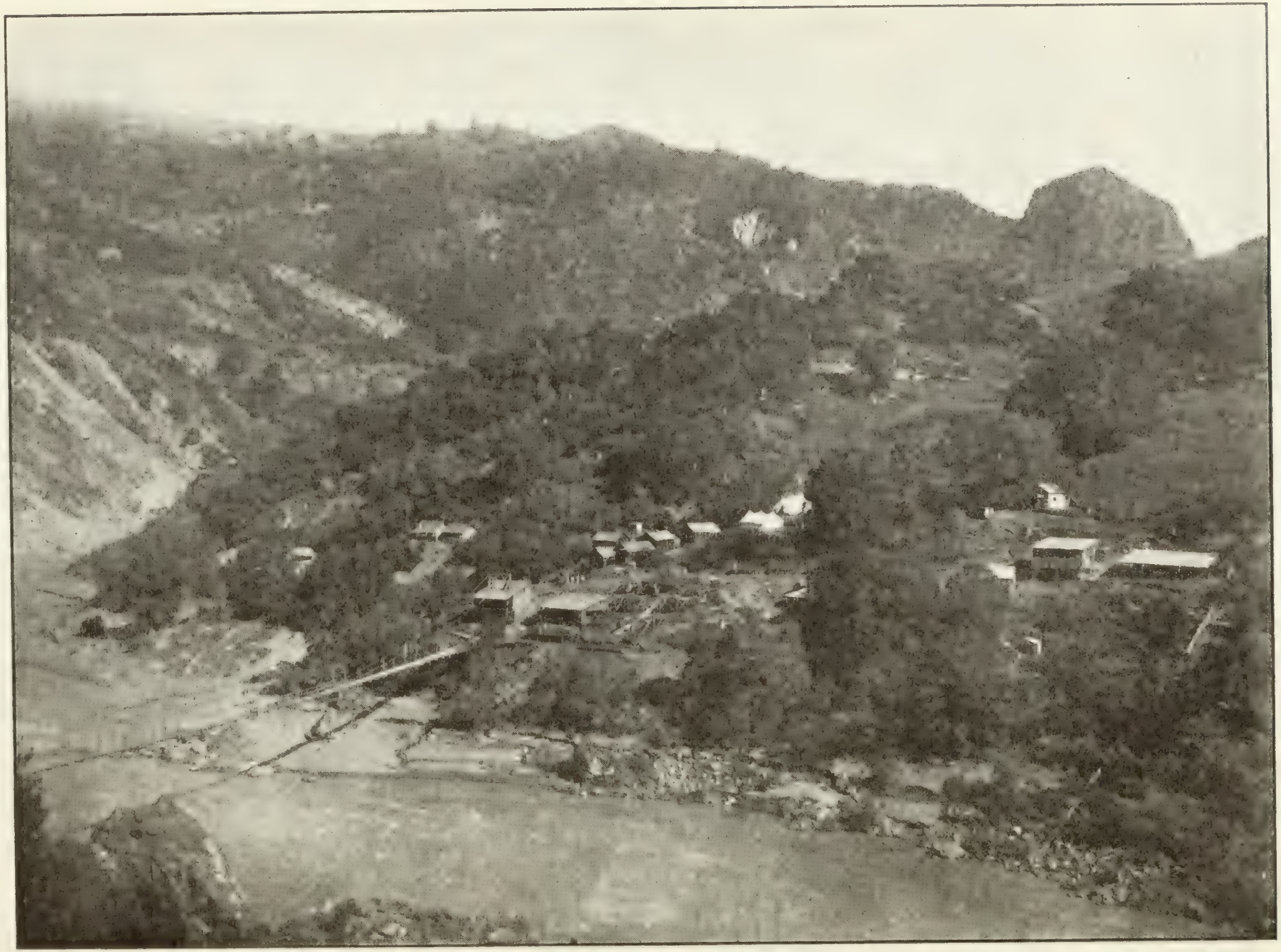


Photo No. 1. Island Mountain Consolidated; croppings and improvements.

Island Mountain Consolidated, in Secs. 9, 10 and 15, T. 5 S., R. 6 E., in the Horseshoe mining district, 90 miles north of Ukiah. Owners, Leach and Wilcox, of Oakland, Cal. Comprises 275 acres along the Eel River; elevation 750 feet; located in 1892; ore, iron sulphides, carrying copper, iron and zinc, occur in lenses between sandstone walls; strike northwest and southeast; greatest depth 145 feet; workings consist of 400-foot tunnel and 2000 feet of drifts; claim 300,000 tons of ore in sight; croppings in places 180 feet wide, and can be traced for 500 feet; equipment consists of dwellings and shops; only little work done since 1895; about $20,000 has been spent in development work. The Northwestern Pacific Railroad is being built on a portion of this property and ore will be shipped to a smelter as soon as the road is completed. Largest copper mine in Trinity County. (See photo No. 1.)

Bibl.: Bull. No. 50, p. 148.

Jackson & Carter, in Sec. 29, T. 31 N., R. 10 W., 8 miles southeast of Hay Fork. Owners, Carter & Jackson. Comprises 4 claims; 40-foot shaft; lode 10 feet wide; can be traced only a short distance; ore consists of sulphide of iron and copper, said to assay 10% copper. Idle.

Lone Pine, in Sec. 19, T. 1 N., R. 8 E., H. M., near the mouth of Rattlesnake Creek. Owners, D. and M. Murphy. Holdings consist of two claims. Only slightly developed. Ore occurs in diorite, and is a copper sulphide. Idle.

Bibl.: Bull. No. 50, p. 142.

Murphy, in Sec. 36, T. 1 N., R. 7 E., H. M., in the Hyampom Valley. Owners, M. and D. Murphy. Three shafts and one tunnel over 400 feet long. Ore occurs in serpentine, in veins of white feldspathic rock, carrying high grade oxides, carbonates and sulphide. Idle.

Bibl.: Bull. No. 50, p. 142.

Nonpareil, in Sec. 5, T. 36 N., R. 12 W., 3 miles southeast of Couer, in the Trinity Reserve. Owner, C. S. McAtes, of Redding; short tunnel on the property; lode varies from 1 to 14 feet in width, but can not be traced continuously for any distance; gossan croppings in places for a mile along its strike; ore said to average 8% copper. Idle.

Bibl.: Report XIII, p. 64; Bull. No. 50, p. 143.

Quimby, on Quimby Creek, in the Trinity Reserve, owned by the Quimby Mining Company; six claims; vein 4 feet wide; sulphide, iron and copper, is oxidized near the surface and was milled; two tunnels, 100 and 400 feet in length; 300 feet of drifts. Idle.

Bibl.: Bull. No. 50, p. 144.

Vine Oak, consists of two claims, in Secs. 2 and 35, T. 1 N. and 1 S., R. 7 E., owned by I. P. Collins, Hay Fork. Ore consists of copper sulphide, carrying some gold, and occurs in diorite. Slightly developed by means of short tunnels.

Bibl.: Bull. No. 50, p. 143.

GOLD.

Native gold is the principal valuable mineral of the veins, as the sulphides form only a small part of the total volume. The fissure veins are usually associated with dikes of soda-granite porphyry. The veins are persistent both in dip and strike, and below a shallow zone of surface enrichment show no marked change in character with depth. The pocket deposits are usually found along faulted contacts of the slate and meta-andesite. The vein filling consists of quartz and calcite, with small amounts of galena, sphalerite and arsenopyrite, as well as free gold.

MINING DISTRICTS.

Canyon Creek Mining District, famous in the early days for its rich placers, both creek and bench, is now being developed for quartz. This creek heads in the Salmon Range in T. 39 N., R. 10 W., and flows south and empties into the Trinity River at Junction City in Sec. 12, T. 33 N., R. 10 W. The formation in this region consists of hornblende schist and granite-porphyry. The first quartz location was made in 1889, on the Chloride, now one of the claims of the Globe group.

Bibl.: Report X, pp. 710–711; Bull. No. 540, pp. 76–78, U. S. G. S.

Coffee Creek, one of the main tributaries of the Trinity, heading in the Granite Mountains of the Salmon River and flowing easterly through townships 37 and 38, has been worked for years for placer gold. The topography of the section between the headwaters of this creek and the Salmon River, in Siskiyou County, indicates that the river formerly had an outlet through Coffee Creek channel to the valley of the Trinity. Quartz mining has been diligently pursued along Coffee Creek and its tributaries, in recent years, and several high-grade producers developed.

Bibl.: Report X, p. 697.

Deadwood Mining District, is situated on the western slope of the Trinity range, in T. 33 N., R. 8 W., and is a continuation of the French Gulch mineral belt. Brown Bear is the famous quartz mine in this district.

Bibl.: Report X, pp. 713–714; U. S. G. S. Bull. No. 540, pp. 69–71.

In the *East Fork Mining District*, the formation is mainly granitic gneiss and mica schists, overlying the true granite, and the quartz veins seem to be incased in the strata between the primary and metamorphic rocks. In portions of this district the stratified rocks are much contorted, giving the veins very uncertain courses or dips, being especially noticeable in the Enterprise mine, where the vein has been disturbed and broken and is resting on the formation as a blanket ledge. The mica of the gneiss and schist is of a silvery white (muscovite), in places the mica entering the quartz, forming a quartz schist, and in such cases the vein yielded to the granitic rocks and pinched out. The Enterprise is the most active quartz mine in this district.

Bibl.: Report X, p. 710.

The Minersville District includes the country along the Trinity River between Trinity Center and Papoose Creek.

The contact between meta-andesite and slate has furnished rich pocket deposits, especially in the vicinity of the old town of Minersville. Much gold has also been supplied to the placers of this neighborhood from the same source.

The Five Pines is the most active quartz mine in this district at the present time.

Bibl.: U. S. G. S. Bull. No. 540, pp. 73–76.

Stewart's Fork, heads in the Salmon Mountains in T. 37 N., R. 10 W., and flows southeasterly, emptying into the Trinity River in T. 34 N., R. 9 W. On Deer Creek, one of the tributaries to Stewart's Fork, several quartz locations have been made, but only a small amount of development work has been done. This region presents a promising field for the prospector. The formation consists of granite, with slate, and also large belts of dolomitic limestone in contact with the serpentine from the northeast; the quartz is white, containing sulphurets of arsenical iron, galena, copper and zinc; but little free gold is detected by panning.

Bibl.: Report X, p. 713.

Trinity Center Mining District, noted for the richness of its auriferous gravels, was settled in 1851. The deposits of gravel are in the form of benches caused by old river channels, and are about 1 mile in width, varying in depth from 20 feet on the lower to 80 feet on the upper benches, being a section of the flow of gravel from Coffee Creek to the Weaver Basin. Dredging operations are being successfully pursued near the town of Trinity Center. A large area of placer ground along the Trinity River between Trinity Center and Carrville, affords an excellent dredging field.

Bibl.: Report X, p. 698; Bull. No. 540, p. 19, U. S. G. S.

GOLD MINES—QUARTZ.

Alaska, in Sec. 15, T. 35 N., R. 11 W., in the East Fork mining district, 10 miles northeast of North Fork. Owners, W. F. Jenkins et al. Comprises 40 acres, at an elevation of 3100 feet; ore shoot is 340 feet long and 2½ feet wide between slate walls; 560-foot tunnel and 1500 feet of drifts; 1 stope (100 feet by 4 feet by 80 feet); old 13-foot arrastra used for milling purposes; ore is free milling and rich; said to have produced $600,000; several years since property has been worked; no ore in sight.

Bibl.: Report XIII, p. 437.

Amy Balch, in Sec. 13, T. 33 N., R. 8 W., in the Deadwood mining district, 1 mile south of Deadwood. Owner, M. G. Carter. Comprises 60 acres, at an elevation of 3400 feet; ore shoot is 110 feet long and 16 inches wide, free milling and high grade, between walls of quartz-porphyry; strike of vein S. 40° E.; dip 40° N.; greatest depth 140 feet; workings consist of 540-foot tunnel, 400 feet of drifts, 90-foot raise and 1 stope 50 feet by 3 feet by 90 feet; equipment consists of cars, dwellings and 9-foot arrastra run by waterpower from Thorne Gulch, through a ditch 1 mile long; 2 men are employed doing prospect work; said to have produced $60,000.

Bibl.: Report XIII, p. 437.

Armstrong, in Sec. 6, T. 37 N., R. 12 W., in the New River mining district, ¾ mile north of Denny, in the Trinity Reserve. Owner, J. E. Miller. Comprises 40 acres; located in 1890; small vein in quartz-porphyry; 210-foot tunnel; little high-grade taken out on the surface. Idle.

Bibl.: Report XIII, p. 437.

Big Chief, in Sec. 16, T. 8 N., R. 8 E., in the New River mining district, 2 miles south of Denny in the Trinity Forest Reserve. Owners, Ladd Brothers. Comprises 40 acres; located in 1908; elevation 3800 feet; extent of ore shoot not determined, but exposed continuously in tunnel, 100 feet long; walls are schist; width of vein 14 inches; ore runs from $15 to $60 per ton; good prospect; one man working.

Bigelow, in Secs. 15 and 16, T. 34 N., R. 10 W., in the Canyon City mining district, 1½ miles southeast of Dedrick, in the Trinity Forest Reserve. Owner, J. E. Henry. Comprises 20 acres; short ore shoot in hornblende-schist and granodiorite; 70-foot shaft; little high-grade extracted; endeavoring to find ore shoot beyond a fault; 2 men employed.

Blue Jacket, in Secs. 17 and 18, T. 37 N., R. 7 W., in the Trinity Center mining district, 1½ miles northwest of Carrville, in the Shasta

Reserve. Owner, Adams Exploration Company, an eastern corporation. G. L. Carr, superintendent. Comprises 450 acres; ore shoot 200 feet long and 5 feet wide; strike N. 40° E.; dip 40° SE.; footwall is serpentine and hanging-wall is quartz-porphyry; maximum depth, 320 feet. Workings: Tunnel 820 feet long, drifts, raises and stopes. Equipment: Cars, dwellings, blower, 5-stamp mill, driven by water-power from Coffee Creek through $\frac{3}{4}$ mile of flume; 3 men employed; some ore in sight; producer at one time; ore free milling, but low-grade, with rich spots occasionally.

Bibl.: Report XIII, p. 439.

Blue Jay, in Sec. 13, T. 37 N., R. 8 W., in the Trinity Center mining district, $2\frac{1}{2}$ miles west of Carrville, in the Shasta Forest Reserve. Owner, M. McIllwain. Comprises 40 acres; located in 1886; 2 veins in quartz-porphyry; short ore shoot 16 inches wide; tunnels 500 feet long and 200 feet of drifts; little high grade extracted. Idle.

Blue Jay, formerly known as Knob, in T. 33 N., R. 8 W., in the Lewiston mining district, $4\frac{3}{4}$ miles northeast of Lewiston. Owners, Paulson & Gifford. Comprises 40 acres on Eastman Gulch; ore shoot 80 feet long and 1 foot wide; high-grade stringers running from vein; 480-foot tunnel, 200 feet of drifts, 100-foot raise to surface from tunnel and 1 stope 40 feet by 3 feet by 100 feet; equipment consists of cars, blacksmith shop and dwelling; 2 men employed; ore reduced in the Venicia mill.

Bonanza, in Sec. 9, T. 35 N., R. 11 W., in the East Fork mining district, 13 miles northeast of North Fork by trail, in Trinity Reserve. Owner J. L. Johnston. Comprises 40 acres at an elevation of 3000 feet; 320-foot tunnel and 500 feet of drifts and raises; ore free milling and shoot 300 feet long and 4 feet wide; little rich ore extracted. Idle at present.

Bonanza, in Sec. 29, T. 35 N., R. 8 W., in the Minersville mining district, $\frac{3}{4}$ mile north of Minersville, in the Trinity Reserve. Owner J. H. Tourtellate. Comprises 40 acres, located in 1890; elevation 2700 feet; short ore shoot, free milling and high grade, in slate; 130-foot incline shaft, 200-foot drift and 60-foot tunnel; $15,000 extracted from pockets. Idle at present.

Bibl.: Report XIII, p. 439.

Brown Bear, in Secs. 11 and 12, T. 33 N., R. 8 W., in the Deadwood mining district, in the old town of Deadwood, is the most famous quartz mine in Trinity County, having been a producer since 1875. It is owned by the Brown Bear Mining Company of Redding. Thos. McDonald, president; B. McDonald, superintendent. Comprises 586 acres of quartz locations of which 200 are patented and 671 acres of timber land; number of veins, two—Monte Cristo and Last Chance; free milling; ore shoot 600 feet long and 2 feet wide; strike east and west; dip 60° E.; walls are slate; workings consist of seven tunnels from 100 to 2400 feet in length, the main workings being on the Last Chance and Ned Roberts claims; greatest depth on vein, 750 feet; over 3000 feet of drifts and several stopes (200 feet by 4 feet by 200 feet); equipment: cars, dwellings, assay office and 10-stamp mill and two Wilfley tables, driven by waterpower from Deadwood Creek through a 3-mile ditch; four men employed at present, one on top and three in the mine; five men are leasing from the company; a production record of $8,000,000 is claimed.

Bibl.: Report VIII, p. 639; X, p. 713; XII, p. 308; XIII, pp. 440–441. U. S. G. S. Bull. No. 540, pp. 70–71.

Buck, in Sec. 14, T. 32 N., R. 9 W., in the Indian Creek mining district, 4½ miles southeast of Douglas City. Owner, J. W. Phillips. Comprises 40 acres; located in 1890; short ore shoot, 6 inches wide, in slate; 210-foot tunnel, 200 feet of drifts and a stope, 40 feet by 3 feet by 50 feet; some high grade near the surface; ore somewhat rebellious as depth is attained; old 9-foot arrastra. Idle.

Bully Choop, in Secs. 5, 8, 9 and 4, T. 31 N., R. 8 W., in the Indian Creek mining district, 16 miles southeast of Douglas City. Owner, Bully Choop Gold Mining and Power Company of Atlanta, Georgia, J. F. Beck, president. Comprises 588 acres, of which 198 are patented. Length of pay shoot, 230 feet; width, 6 feet; strike east and west; dip 40° S.; walls quartz-porphyry; greatest depth, 320 feet; workings, several tunnels, longest being 1700 feet, several thousand feet of drifts, raises and stopes; ore, free milling, but becomes somewhat base as depth is attained; water for power obtained from north and south forks of Indian Creek, through a 3-mile ditch. Equipment: cars, dwellings, sawmill, electrical plant, telephone line (15 miles long), and 30-stamp mill driven by water and electrical power; has been a producer; some ore reserve in the mine. Idle at present.

Bibl.: Report VIII, pp. 640-641; XII, p. 308; XIII, p. 441.

Carrie, in Sec. 5, T. 37 N., R. 12 W., in the New River mining district, 3 miles northeast of Denny, in the Trinity Reserve. Owner, G. Ferney. Comprises 20 acres at an elevation of 4600 feet; small vein, in diabase; 380 feet of tunnels and 300 feet of drifts; ore high grade; some rich pockets found; produced $16,000. Worked by lessee.

Chapman, in Sec. 33, T. 38 N., R. 8 W., in the Trinity Center mining district, 7 miles northwest of Carrville, in the Shasta Forest Reserve. Owner, W. Chapman. Comprises 60 acres, at an elevation of 3700 feet; ore shoot is 80 feet long and 2 feet wide, in serpentine;

220-foot tunnel, 130-foot drift and 40-foot winze; 5½-foot Huntington mill, run by both steam and waterpower; 20 h.p. boilers; two men employed; some high grade ore; said to have produced $20,000.

Cleveland, in Secs. 4, 9 and 16, T. 31 N., R. 8 W., in the Indian Creek mining district, 15 miles southeast of Douglas City. Owner, Cleveland Consolidated Mining Company, of Red Bluff, Cal., R. G. Hart, president. Comprises 100 acres, patented, at an elevation of 5800 feet; 12-mile trail to mine; 300-foot ore shoot, 7 feet wide; low grade and base as depth is attained; greatest depth, 220 feet; 460-foot tunnel and 300 feet of drifts. Idle. Said to have a small production record.

Craig, formerly known as the *Mason and Thayer,* in Secs. 4, 5, 32 and 33, T. 34 and 35 N., R. 10 W., in the Canyon Creek mining district, 3 miles northeast of Dedrick, in Trinity Reserve. Owner, Craig Mining Company, F. M. Craig, president and manager; H. C. Stofer, superintendent. Comprises 100 acres, acquired by this company in 1911; elevation 4200 feet; length of ore shoot, 400 feet, width 4 feet; length driven on vein, 830 feet; depth on vein, 420 feet; three tunnels, on vein, from 100 to 830 feet in length, with drifts and crosscuts, comprise several hundred feet of development work; walls are hornblende schist; strike of vein northwest and southeast; dip 60° N.; equipment consists of cars, dwellings and assay office; number of men employed—top, four; mine, eight; total twelve; considerable tonnage of ore blocked out, all free milling; one of the best properties in the district, ranking next to the Globe; excavation made for a 20-stamp mill.

Bibl.: U. S. G. S. Bull. No. 540, p. 78.

Dixie Queen, in Secs. 14 and 23, T. 32 N., R. 9 W., in the Indian Creek mining district, 5 miles southeast of Douglas City. Owners, Morris Brothers. Comprises 20 acres, at 2700-foot elevation; small vein, high grade and free milling, in slate; 150-foot tunnel and 100-foot drift; two men employed; about $10,000 taken out in pockets.

Enterprise, in Secs. 4 and 5, T. 35 N., R. 11 W., in the East Fork mining district, 7½ miles north of North Fork, in the Trinity Forest Reserve. Owner, Enterprise Gold Mining Company, of Boston, Mass., Geo. S. Fenwick, secretary; comprises 160 acres, the first claim, Lone Jack, being located in 1882, and mine has been operated more or less continuously ever since; number of veins, 1; ore free milling and of good grade; length of pay shoots—three shoots—900, 300 and 300 feet, and average width of 14 inches; strike northeast and southwest; dip from 10° to 45° NW.; diorite walls; several tunnels, one being 1400 feet long; 3000 feet of drifts and crosscuts; three stopes, 500 feet by 5 feet by 50 feet, 900 feet by 5 feet by 200 feet, and 300 feet by 5 feet by 240 feet; greatest vertical depth, 500 feet; equipment: cars, 5 machine drills, Compressor plant, Cameron pump, small electric plant, sawmill, assay office, dwellings and small underground winch; 10-stamp mill, run by waterpower, 1 Frue and 1 Woodbury table; number of men employed, mine 10, mill 2, total 12; production to date, over $350,000; cost over $7 per ton for operating; mine leased to Skinner & Day, who milled 1300 tons and saved $20,000 on the plates; considerable ore blocked out; some of the ore carries tellurium.

Bibl.: Report VIII, p. 643; X, p. 710; XI, p. 482; XIII, p. 446.

Eureka, in Sec. 33, T. 35 N., R. 10 W., in the Canyon Creek mining district, 3 miles south of Dedrick. Owner, Maple Creek Mining Company, of Weaverville; L. E. Smith, president; P. Flathery, superintendent; comprises 120 acres; 200-foot ore shoot, 3 feet wide, between schist and porphyry walls; 400-foot tunnel and stope (60 feet by 4 feet by 80 feet) on Gray Eagle Claim; ore worked in arrastra at one time; 2 men employed, doing assessment work.

Excelsior, in Secs. 5 and 8, T. 37 N., R. 12 W., in the New River mining district, 2½ miles northeast of Denny, in the Trinity Forest Reserve. Owners, Harris & Colegrave; comprises 80 acres, at an elevation of 4800 feet; ore shoot 300 feet long and 18 inches wide; between granite walls, maximum depth 315 feet; strike northwest and southeast; dip N. 50° E.; two tunnels, one on vein having a length of 700 feet and the crosscut 240 feet; 1600 feet of drifts, several raises and stope (100 feet by 3 feet by 90 feet); old 2-stamp mill; said to have produced $160,000; only high grade ore worked. Idle.

Bibl.: Report XIII, p. 446.

Fairview, in Sec. 3, T. 34 N., R. 8 W., in the Minersville mining district, 1½ miles southeast of Minersville, in the Trinity Forest Reserve. Owner, Fairview Mining Company, of San Francisco; Charles Allenberg, president; H. Waldo, superintendent; comprises 320 acres, of which 160 acres are patented; elevation 3000 feet; strong fissure vein, in slate; strike northeast and southwest; dip 40° S.; ore shoot is 500 feet long and 3 feet wide; greatest depth on vein, 450 feet; workings consist of 4 tunnels from 150 to 1500 feet in length, all connected with a raise and 2 stopes (100 feet by 4 feet by 140 feet); equipment consists of cars, 1000 feet of automatic tramway, assay office, dwellings and 40-stamp mill, driven by waterpower; water obtained from Stewart Fork, through a ditch five miles long; production $500,000, from 1900 to 1907, and during this time 100 men were employed; since 1907 it has been worked by lessees.

Bibl.: U. S. Geol. Surv. Bull. No. 540, pp. 75–76.

Five Pines, in Secs. 20 and 29, T. 35 N., R. 8 W., in the Minersville mining district, two miles northwest of Minersville, in the Trinity Reserve; owner, Five Pines Mining Company, of Minersville, H. J. Van Ness, president; L. Van Ness, manager; located in 1896; length of ore shoot not determined; ore occurs in meta-andesite and slate, and is free milling and high grade; workings consist of incline shaft, 225 feet deep, one level with 90-foot drift and 1 stope (100 feet by 3 feet by 60 feet); equipment, small hoist, cage, dwelling and 2-stamp mill; waterpower used; 4 men employed; production to date, $275,000; coarse gold and 80 per cent of the total value recovered in hand mortar and pan; rich pockets occur along the water courses; in a vertical depth of 44 feet, $45,000 was extracted from one pocket; other pockets run from $10,000 to $15,000; surface ore is honeycombed and stained with manganese oxide; best producer in this district.

Bibl.: U. S. Geol. Surv. Bull. No. 540, pp. 73–74.

Forget-Me-Not, in Secs. 8 and 9, T. 37 N., R. 7 W., in the Trinity Center mining district, 1½ miles northeast of Carrville, in the Shasta Reserve. Owner, Carr Estate; comprises 34 acres, at an elevation of 3500 feet; ore shoot 100 feet long and 2 feet wide, free milling; footwall is diorite and hanging-wall quartz-porphyry; strike N. 40° E., dip 20° S.; workings: tunnel 1000 feet long, 400 feet of drifts from old shaft (100 feet deep), two stopes 40 feet by 3 feet by 50 feet; equipment: cars, dwelling, 50-h.p. boiler, 5-stamp mill driven by steam and water power; some high grade ore worked in an arrastra years ago; producer at one time; bonded to Adams Exploration Company. Idle at present.

Bibl.: Report XIII, p. 446.

Fountain Head, in Sec. 4, T. 34 N., R. 11 W., in the North Fork mining district, 5 miles north of North Fork. Owner, R. Ellson; comprises 40 acres, reached by trail from North Fork; short ore shoot in slate; ore free milling and high grade; 460-foot tunnel, drifts and stope; old 5-stamp mill, steam driven (idle); said to have produced over $50,000; ore reserve worked out; idle at present.

Bibl.: Report XIII, p. 447.

Four Point, in Sec. 32, T. 35 N., R. 10 W., in the Canyon Creek mining district, 3 miles north of Dedrick, in the Trinity Reserve. Owner, H. C. Stofer et al.; comprises 40 acres, located in 1894; 150-foot tunnel, all in ore, 15 inches wide; hornblende schist and quartz-porphyry walls; building a 12-foot arrastra to be operated by water from Chloride Gulch; three owners working.

Globe, in Secs. 15, 16 and 21, T. 35 N., R. 10 W., in the Canyon Creek mining district, 4 miles north of Dedrick, in the Trinity Reserve.

Owner, Globe Consolidated Mining Company, a Canadian corporation; J. B. Goodyear, president; T. M. Craig, secretary; W. Macgreagor, superintendent; comprises 200 acres, acquired in 1910, and includes the old Bailey, Chloride and Globe groups; elevation, 6100 feet; length of ore shoot, 600 feet; width 6 feet; strike northeast and southwest; dip 60° E.; walls, hornblende schist; number of veins, 4: Chloride, Bailey, Globe and Boyd; free milling ore; length driven on vein, 1700 feet; greatest depth on vein, 620 feet; 6 tunnels in all, from 250 to 1700 feet long; several thousand feet of tunnels, crosscuts, drifts and stopes; one stope is 200 feet by 6 feet by 40 feet (filled with waste); large tonnage blocked out in mine; mine equipment: cars, compressor plant, electrical plant, sawmill, dwellings, assay office, executive offices;

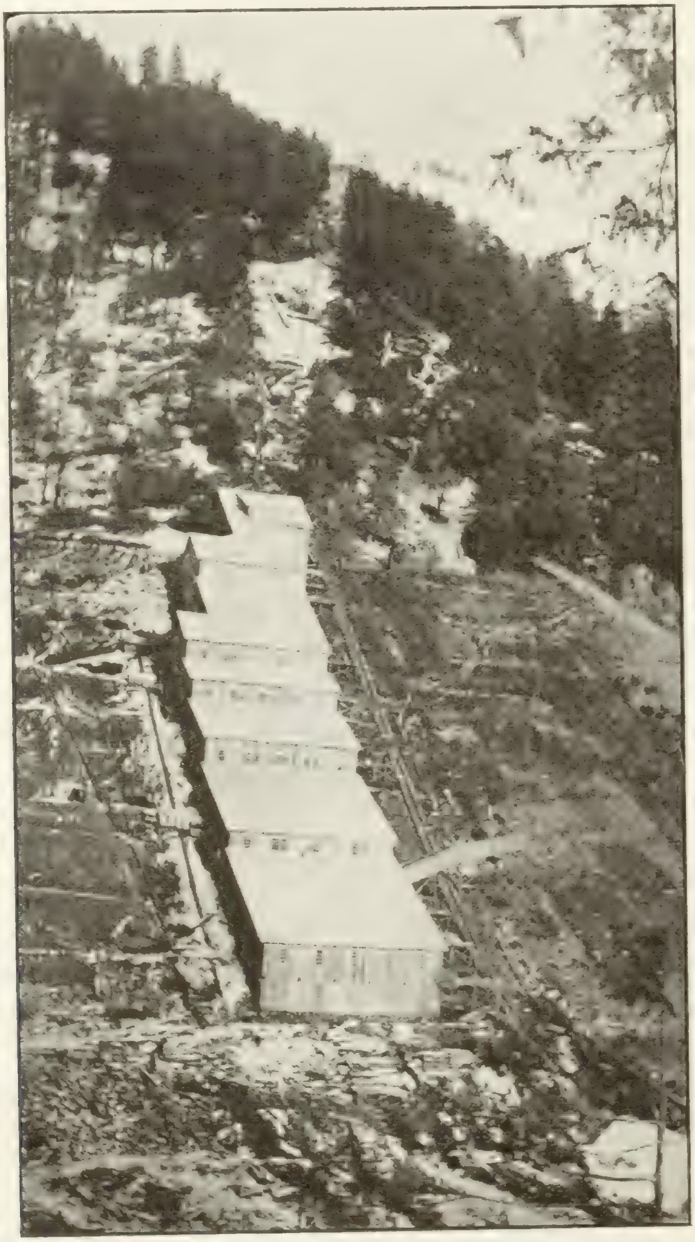


Photo No. 2. Globe Mine; 20-stamp mill.

reduction equipment: 20-stamp mill just completed (direct cyaniding), 100-ton cyanide plant, tubemill, 5600-foot automatic-gravity tramway from mine to the mill, 500-ton bins; water power used from Canyon Creek; plant complete cost over $300,000; number men employed: top 85, mine 25, total 110; property said to have produced $700,000 before acquired by this company. (See photos Nos. 2 and 3.)

Bibl.: Reports X, p. 711; XI, p. 483; XII, pp. 309, 310; XIII, p. 447; U. S. Geol. Surv. Bull. No. 540, pp. 76–78.

Photo No. 3. Globe Mine; section of flume.

Golden Chest, in Sec. 9, T. 35 N., R. 11 W., in the East Fork mining district, 13 miles northeast of North Fork, by trail, in Trinity Reserve. Owners, Boyce et al.; comprises 40 acres, at an elevation of 3300 feet; ore shoot, 300 feet long and 2 feet wide; fissure vein, with slate walls; strike east and west; dip 40° S.; 490-foot tunnel, several hundred feet of drifts and stopes; only worked to a shallow depth, 150 feet; free milling ore of good grade; equipment: cars, dwellings, 5-stamp mill (old 750-pound stamps), and 4 concentrators; idle for several years; some rich ore worked at one time and property said to have produced $200,000.

Bibl.: Reports X, p. 711; XIII, p. 447.

Golden Jubilee, in Sec. 10, T. 37 N., R. 8 W., in the Trinity Center mining district, 8 miles southwest of Carrville, in the Shasta Reserve. Owner, Coffee Creek Mining and Milling Company, of Redding; R. M. Saeltzer, president; J. Boedecker, superintendent; comprises 150 acres, patented; elevation, 3200 feet; length of ore shoot, 140 feet; width, $2\frac{1}{2}$ feet; strike northeast and southwest; dip 40° E.; footwall slate, and hanging-wall diorite; workings consist of tunnel 750 feet long, several hundred feet of drifts, raises and stopes; equipment: cars, dwellings, blower and pipe, assay office, and 10-stamp mill driven by steam and water power (idle); 50-h.p. boiler; 5 men employed in mine; some high grade ore extracted; paid some dividends; said to have produced $250,000.

Hardtack, in Sec. 6, T. 37 N., R. 12 W., in the New River mining district, 1 mile north of Denny, in the Trinity Reserve. Owner, T. J. Ladd; comprises 40 acres, located in 1889; elevation 4700 feet; ore shoot 80 feet long and 18 inches wide, in quartz-porphyry; 320-foot tunnel; little high grade ore extracted; only do assessment work.

Bibl.: Report XIII, p. 448.

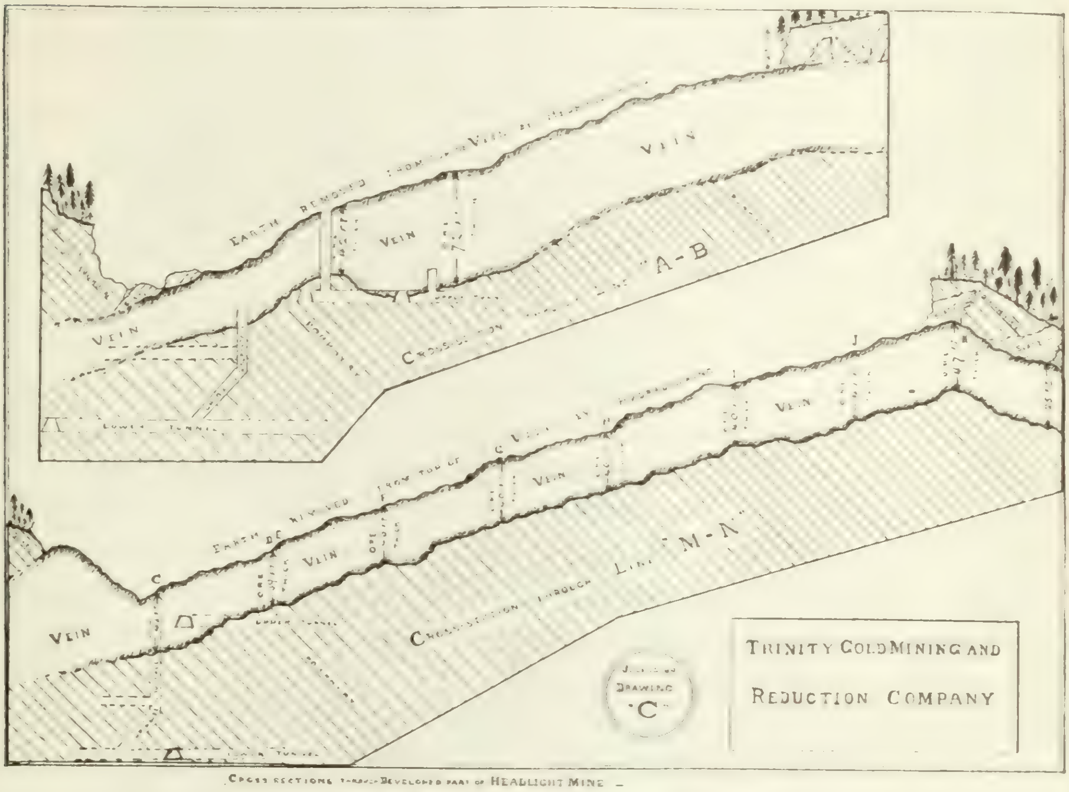
Hard Times, in Sec. 6, T. 37 N., R. 12 W., in the New River mining district, 3 miles north of Denny, in the Trinity Reserve. Owner, E. C. Miller; comprises 60 acres, at an elevation of 4400 feet; ore shoot 100 feet long and 2 feet wide in diabase; 210-foot tunnel and 400 feet of drifts; some rich ore extracted; said to have produced $20,000; worked at times by lessees. Idle.

Bibl.: Report XIII, p. 448.

Hay Fork Mining and Milling Company, in T. 31 N., R. 11 W., about 3½ miles southeast of Hay Fork. Owner, Dr. Mueller et al., of Redding; comprises 100 acres, at an elevation of 3400 feet; 2 veins in schist; short ore shoot; 3 tunnels, from 60 to 230 feet in length; little high grade extracted. Idle.

Headlight, in Secs. 20 and 21, T. 37 N., R. 7 W., 1½ miles southeast of Carrville, has the largest reduction plant in Trinity County. It is owned by the Trinity Gold Mining and Reduction Company, of New York; H. W. Miller, president; J. H. Lee, secretary; D. W. Shanks, general manager; D. Goodale, superintendent; comprises 423 acres, of which 320 acres are patented; in the Shasta Reserve; elevation, 3500 feet; ore shoot, 600 feet long and 35 feet wide, with several deposits, also; strike east and west; dip 22° N.; footwall, andesite, and hanging-wall, slate; maximum depth, 200 feet; workings consist of several tunnels, one being 350 feet long, open cuts, raises and drifts, comprising several thousand feet of development work; ore free near the surface, but base with depth, containing iron and copper sulphides (see map-drawing "C"); company claims 300,000 tons at value of $6 per ton, as an ore reserve; mine equipment: cars, tools, 2 giants and pipe, shops, 700 h.p. electrical plant, with 2 miles of power line, assay office, sawmill, and dwellings; reduction equipment: 40-stamp Hendy mill, electrically driven, and 250-ton cyanide plant, constructed in 1910, and idle at present, as values can not be saved and experiments have been made so far without success; 8 men are employed; production to date, $500,000, in two years; ore runs from $6 to $8 per ton; total operating cost per ton, from $2.10 to $2.40; electric plant is on Coffee Creek; one of the best equipped quartz mines in the county.

Bibl.: Report XIII, p. 449.



Headlight Mine, Trinity County, California.

Hunter, in the New River mining district, 40 miles by trail from Helena, in Trinity Reserve. Owner, J. P. Hennessy; comprises 120 acres, located in 1888; elevation 4500 feet; extent of ore shoot not determined; can be traced for 400 feet on the surface; workings consist of 500-foot crosscut tunnel and 600 feet of drifts, 1 stope and 60 and 80 foot raises; equipment: cars, dwellings, 10-stamp mill (850 lb. stamps), one Frue vanner run by steam power; vein is spotted, with high grade found at times; idle since June, 1912; 9 men employed when in operation; small producer.

Bibl.: Report XIII, p. 450.

Isabel, in Sec. 32, T. 35 N., R. 10 W., in the Canyon Creek mining district, 2½ miles north of Dedrick, in the Trinity Reserve. Owner, T. E. Martin; comprises 60 acres; short ore shoot in granite; 210 and 90 foot tunnels; said to have produced some high grade ore. Idle.

Jacoby, T. 33 N., R. 9 W., about 6 miles northeast of Lewiston, on Eastman Gulch. Owners, Goodyear & Richards; comprises 80 acres, located years ago; ore shoot is 100 feet long and 14 inches wide, free milling and good grade; footwall is slate and hanging-wall quartz-porphyry; strike northwest and southeast; dip 15° S.; workings consist of 550-foot tunnel, 400 feet of drifts, and 1 stope, 60 feet by 3 feet by 90 feet; greatest depth on vein is 200 feet; equipment consists of cars, dwelling and 2-stamp Hendy mill (1000-lb. stamps), driven by waterpower from Eastman Gulch through a ditch $\frac{3}{4}$ mile long; best ore in pockets and worked for high grade; a production of $50,000 is claimed; leased to Paulson Brothers; idle at present.

Jerusalem, in Sec. 9, T. 31 N., R. 8 W., in the Indian Creek mining district, 10 miles west of Ono, by trail. Owner J. T. Lockhard; comprises 80 acres; ore shoot is 200 feet long and 2 feet wide; 560-foot tunnel and 300 feet of drifts; some rich ore extracted at one time; idle for several years.

Bibl.: Report XIII, p. 450.

Lapman, in Sec. 12, T. 33 N., R. 8 W., in the Deadwood mining district, $\frac{3}{4}$ mile north of Deadwood. Owner, Calumet-Michigan Mining Company, of Detroit; comprises 60 acres, on Thorne Gulch; ore shoot is 100 feet long and 10 inches wide; slate footwall, and quartz-prophyry hanging-wall; 3 tunnels on vein from 50 to 450 feet long and 300 feet of drifts; little high grade ore extracted; being worked by George Bacon, on a lease, who is prospecting for "high grade."

Last Chance, in T. 33 N., R. 8 W., in the Lewiston mining district, 5 miles northeast of Lewiston. Owners, Newland & Dean. Comprises 60 acres on Eastman Gulch; small vein, high grade, in slate; 220-foot tunnel, 250 feet of drifts, and 1 stope; equipment consists of cars and dwellings; worked for "pockets"; claim a production of $20,000. Idle at present.

Laurel, in Sec. 14, T. 32 N., R. 9 W., in the Indian Creek mining district, 4 miles southeast of Douglas City. Owner, C. E. Connor. Comprises 20 acres; located in 1893; small vein; worked for pockets; rich bunch taken out near surface; 180-foot tunnel. Idle.

Layman, formerly known as *Horseshoe,* in Sec. 33, T. 32 N., R. 11 W., in the Hay Fork mining district, 2 miles north of Hay Fork. Owner, Estate of J. B. Layman. Comprises 120 acres, at an elevation of 2900 feet; 2 parallel veins, about 400 feet apart; short ore shoot in schist; 3 tunnels, 280, 85 and 60 feet in length; little high grade found. Idle.

Maple, in Sec. 1, T. 34 N., R. 11 W., 4 miles south of Dedrick, in the Canyon Creek mining district, in Trinity Reserve. Owner, T. E. Reed. Comprises 20 acres; located in 1894; 100-foot ore shoot, 12 inches wide, between slate and granodiorite walls; 230-foot tunnel, and 1 stope (30 feet by 3 feet by 40 feet); 12-foot arrastra, run by

15-foot overshot wheel, water being obtained from Canyon Creek through 1 mile ditch; worked as a pocket mine and about $10,000 produced. Owner does only assessment work.

Bibl.: Report XII, p. 312; XIII, p. 454.

Modoc, in Sec. 31, T. 9 N., R. 7 E., in the New River mining district, ½ mile north of Coeur, in the Trinity Reserve. Owner, G. W. Healey. Comprises 20 acres; located in 1889; ore shoot, 130 feet long and 14 inches wide, free milling and good grade; walls are diabase foot and granitic-porphyry hanging; strike is N. 30° W.; dip 50° S.; workings, 480 and 160-foot tunnels, 600 feet of drifts and stope (80 feet by 3 feet by 60 feet); equipment: dwelling and old 1-stamp mill (650-pound stamp), driven by waterpower from Eagle Creek through 1-mile ditch; some high grade ore worked, all free milling; said to have produced $20,000. Idle.

Mountain Boomer is the best producer in the New River mining district, but is very expensive to operate as supplies must be packed over a trail either from Hawkins Bar or North Fork, a distance of 40 miles from the latter town. It is located in Sec. 5, T. 37 N., R. 12 W., in the Trinity Reserve, at an elevation of 5000 feet. Owner, Bobs Farm Mining Company, of Sacramento; J. H. Byers, president; W. H. Montgomery, secretary. Comprises 100 acres; located in 1883; length of ore shoot 260 feet and width 2 feet; walls are hanging, diabase; foot, quartz-porphyry; strike east and west; dip 45° N.; maximum depth 700 feet; workings consist of several tunnels, longest being 1300 feet; 6 levels from 60 to 700 feet long, 2 crosscut tunnels 300 and 600 feet in length, several raises, winzes and stopes (60 feet by 3 feet by 120 feet), all comprising several thousand feet of development work; equipment: cars, dwellings, sawmill, assay office, and 3-stamp mill and one 3-foot Huntington, run by steam and waterpower; tailings impounded in brush dam; number of men employed—mine 10, mill 2, total 12; said to have produced $350,000; lessees are working the old dump running the ore through the two mills.

Bibl.: Report X, p. 715.

Nonpareil, in Sec. 9, T. 37 N., R. 7 W., in the Trinity Center mining district, 2 miles northeast of Carrville, in the Shasta Forest Reserve. Owners, Strode Brothers. Comprises 40 acres; 2 parallel veins; ore shoot 110 feet long and 2 feet wide; strike N. 40° E.; dip 40° E.; workings, tunnel on vein 420 feet long, 150 feet of drifts and 30-foot winze; ore free milling and some high grade found; said to have produced $20,000. Idle at present.

North Star, in Sec. 32, T. 35 N., R. 11 W., in the East Fork mining district, 8 miles north of North Fork, in the Trinity Reserve.

Owner, North Star Mining Company. Comprises 160 acres; located in 1884; 8 veins in all, being an extension of the Enterprise lode; strike northwest and southeast; dip S. 30° W.; length of ore shoot 300 feet, width 4 feet; free milling ore; walls are quartz-porphyry; 950-foot tunnel, drifts and stopes comprise several hundred feet of development work; greatest depth 400 feet; equipment: dwellings, 10-stamp mill driven by waterpower from east fork of North Fork of Trinity River through 1-mile ditch; ore bins, assay office; said to have produced $200,000. Idle at present.

Bibl.: Report XIII, p. 458.

Oriole, in Sec. 22, T. 32 N., R. 9 W., in the Indian Creek mining district, 4 miles southeast of Douglas City. Owner, A. L. Paulson. Comprises 40 acres; located in 1894; short ore shoot 1-foot wide, in slate; free milling; 140-foot tunnel and 80 feet of drifts; one stope, 40 feet by 3 feet by 40 feet; rotary mill, 5-foot bed (Cannon Ball mill), run by waterpower from Indian Creek; worked as a pocket mine; small producer. Idle at present.

Oro Grande, in Secs. 8 and 9, T. 37 N., R. 7 W., in the Trinity Center mining district, 2½ miles northeast of Carrville, in the Shasta Reserve. Owners, Strode Brothers. Comprises 50 acres; located in 1888; elevation 2600 feet; ore shoot 120 feet long and 3 feet wide, free milling; footwall is andesite and hanging-wall is quartz-prophyry; strike northwest and southeast; dip 40° NE.; maximum depth 400 feet; workings, 2600-foot tunnel, 600 feet of drifts, raises and stope (40 feet by 2½ feet by 80 feet); equipment: cars, 3-drill compressor plant, air blower, dwellings, 5-stamp mill (650-pound stamps), run by waterpower from Hosteller Gulch through 1 mile ditch; 2 men employed; some rich ore produced; pocket taken out in 1912.

Bibl.: Report XIII, pp. 458, 459.

Ozark, in Secs. 4 and 9, T. 34 N., R. 11 W., in the North Fork mining district, 5 miles north of North Fork. Owner, D. G. Reid. Comprises 40 acres. Short ore shoots 2 feet wide in slate; free milling and high grade; tunnel, 420 feet long, 500 feet of drifts and 1 stope (40 feet by 3 feet by 60 feet); old 10-foot arrastra; about $60,000 produced, mostly from pockets. Idle.

Bibl.: Report XIII, p. 459.

Quimby, in Sec. 22, T. 7 N., R. 13 W., in the New River mining district, ½ mile north of Quimby, in the Trinity Forest Reserve. Owner, Larson Brothers. Comprises 160 acres, located in 1902; elevation, 2260 feet; tunnel 150 feet on the vein, all in ore; 2 crosscut tunnels, upper 125 and lower 400 feet long with a 122-foot raise between them; 150 feet of drifts; equipment: cars, dwellings, 6-stamp Merrill mill, and

1 Huntington and 1 table similar to Wilfley, run by waterpower using 3 Pelton wheels; ditch 1½ miles long from Quimby Creek. Ore is base to some extent, carrying copper and arsenic, so that only a 50% extraction is obtained by direct amalgamation. Two men employed. Small producer.

Ralston, in Sec. 32, T. 35 N., R. 10 W., in Canyon Creek mining district, 2 miles northeast of Dedrick, in Trinity Forest Reserve. Owner, Trinity County Bank. Comprises 40 acres; ore shoot 200 feet long in granite and 2 feet wide; 4 tunnels from 50 to 385 feet in length on the vein; 1 stope (60 feet by 3 feet by 80 feet); 2-stamp mill driven by waterpower and steam. Production to date about $40,000. Two lessees working in main tunnel. Some high grade found.

Ray, in Sec. 12, T. 33 N., R. 8 W., in the Deadwood mining district, 1 mile west of Deadwood. Owners, Danners & Hollensworth. Comprises 80 acres, on Donnelly Gulch; small vein in diabase; worked for pockets; small producer at one time; 280-foot tunnel; 200 feet of drifts. Idle.

Bibl.: Report XIII, p. 460.

Reindeer, in Sec. 3, T. 37 N., R. 8 W., in the Trinity Center mining district, 5 miles north of Carrville, in the Shasta Reserve. Owner, Wagner Mining Company of Berkeley, Cal.; C. E. Wagner, president. Comprises 60 acres, at an elevation of 2900 feet; short ore-shoot in granite, 18 inches wide; tunnel 340 feet long and 200 feet of drifts. Two men employed. Ore free milling and of good grade.

Bibl.: Report XIII, p. 461.

Ridgeway, in Secs. 6 and 31, T. 37 and 38 N., R. 12 W., in the New River mining district, 1½ miles north of Denny, in the Trinity Reserve. Owner, Ridgeway Mining Company, of Weaverville; J. T. Jones, president. Comprises 80 acres, at an elevation of 4700 feet; ore-shoot 200 feet long and 1 foot wide; diabase walls, free milling; workings consist of 1000-foot tunnel, 400 feet of drifts, stopes (60 feet by 3 feet by 100 feet), and old incline shaft 200 feet deep (caved); maximum depth on vein, 400 feet; equipment consists of two 30 h.p. boilers, dwellings and old 10-stamp mill (750-pound stamps), run by steam power. Said to have produced $80,000. Worked by lessees at one time. All ore removed. Idle.

Bibl.: Report XIII, p. 461.

Silver Grey, in Sec. 33, T. 35 N., R. 10 W., in the Canyon Creek mining district, 2 miles northeast of Dedrick, in the Trinity Forest Reserve. Owner, R. L. Carter et al. Comprises 40 acres; ore shoot 70 feet long and 15 inches wide; 380-foot tunnel and 120-foot drift and 1 stope (60 feet by 3 feet by 50 feet); 5-foot Huntington mill driven by waterpower; 1-mile ditch from east fork of Canyon Creek. Same high grade extracted. Production to date about $25,000. Two lessees working property at present.

Smith, in Secs. 30, 31 and 19, T. 36 N., R. 9 W., in the Weaverville mining district, 4 miles south of Weaverville. Owners, Paulson & Blake. Comprises 274 acres, at an elevation of 3900 feet; short ore shoot 2 feet wide; in granodiorite; 310-foot tunnel. Small pocket taken out on the surface. Idle. Only do assessment work. Vein not in place and greatest depth (70 feet) has not passed through the zone of disturbance.

Star of the East, in Sec. 13, T. 33 N., R. 8 W., in the Deadwood mining district, 1½ miles south of Deadwood. Owner, M. Brady. Comprises 20 acres, patented. Small vein in quartz-porphyry; some high grade extracted; 310-foot tunnel and several hundred feet of drifts. Idle.

Supplanter, located in Sec. 23, T. 7 N., R. 13 W., in the New River mining district, 2 miles north of Quimby. Elevation 2600 feet. Owners, J. and G. Foutes. Small stringers of high grade ore on the surface. Ore base with depth. Development work consists of several tunnels, 1200 feet of drifts, and a stope; 3-stamp mill and 1500 foot tramway from mine to mill. Worked during the winter. Small producer.

Toughnut, in Sec. 6, T. 37 N., R. 12 W., in the New River mining district, 2 miles north of Denny in the Trinity Reserve. Owner, F. Ladd. Comprises 20 acres, located in 1890; ore shoot 100 feet long and 2 feet wide; diabase foot and quartz-porphyry hanging-walls; 260-foot tunnel. Little high grade ore found. Idle.

Bibl.: Report XIII, p. 464.

Triangle, in Sec. 11, T. 33 N., R. 8 W., in the Deadwood mining district, 1 mile west of Deadwood. Owner, J. Hollingsworth. Comprises 40 acres, at an elevation of 3600 feet. Small vein in slate; 290-foot tunnel, 300 feet of drifts, and 1 stope (40 feet by 3 feet by 60 feet); said to have produced $15,000. Some high grade ore extracted. Idle.

Trinity Bonanza King, formerly known as Bonanza King Consolidated, in Sec. 14, T. 37 N., R. 7 W., in the Trinity Center mining district, 9 miles northeast of Trinity Center, in the Shasta Forest Reserve. Owner, Foster Gold Mining Company, of San Francisco. C. G. Foster, president. Comprises 130 acres, located in 1886. Elevation 6100 feet; extent of ore shoot not determined; formation, slate and quartz-porphyry; 1000-foot tunnel, drifts and stopes (100 feet by 3 feet by 70 feet). Equipment: cars, 3500-foot automatic tramway, assay office, dwellings, electric plant and 20-stamp mill (electrically driven). Idle. Producer at one time. Some rich ore milled. Four men employed in extending lower tunnel. (See photos Nos. 4 and 5.)

Bibl.: Report XIII, p. 440.

Photo No. 4. Trinity Bonanza King Mine. Interior view, 20-stamp mill.

Photo No. 5. Trinity Bonanza King Mine. Automatic tram.

True Blue, in Sec. 21, T. 37 N., R. 7 W., in the Trinity Center mining district, 1 mile southeast of Carrville, in the Shasta Forest Reserve. Owner, George LaBlanc; comprises 9 acres, located in 1892; elevation 3700 feet; ore shoot 80 feet long and 12 inches wide, free milling; slate foot and diorite hanging-walls; 300-foot tunnel; small pocket taken out in 1911; owner doing assessment work.

True Fissure, in Sec. 15, T. 35 N., R. 10 W., in the Canyon Creek mining district, 2 miles north of Dedrick, in the Trinity Forest Reserve. Owner, Bank of Tehama; comprises 40 acres, patented; ore shoot, 250 feet long and 4 feet wide, between schist and granite walls: 2 tunnels, 460 and 120 feet long on the vein, and 600 feet of drifts, and 1 stope; said to have produced $30,000; being worked by two lessees; strong well-defined ledge on the surface; good prospect.

Uncle Sam, in Secs. 32 and 5, T. 9 and 8 N., R. 8 E., in the New River mining district, ½ mile north of Coeur, in the Trinity Reserve. Owner, J. Cullich; comprises 80 acres; ore shoot, 110 feet long and 10 inches wide, free milling and high grade, between diabase walls; strike of vein, N. 40° W.; dip, vertical; 310-foot tunnel, 200-foot shaft, 2 levels with 600 feet of drifts, raises and stope (80 feet by 3 feet by 120 feet); equipment; two 30 h.p. boilers, dwellings, and old 5-stamp mill driven by steam power; said to have produced $60,000; idle at present.

Bibl.: Report XIII, p. 465.

Venicia, in T. 33 N., R. 9 W., in the Lewiston mining district, about 6 miles northeast of Lewiston. Owners, Roberts, Fisher & Peterson; comprises 60 acres, on Eastman Gulch; ore shoot is 250 feet long and 2 feet wide, free milling, between slate walls; strike, northwest and southeast; dip 10° S.; workings consist of 3 tunnels, from 100 to 750 feet in length, each 100 feet apart, 500 feet of drifts and a stope, 100 feet by 3 feet by 200 feet; greatest depth is 200 feet; equipment consists of cars, dwellings, and 5-stamp Hendy mill (1000-pound stamps) driven by waterpower from Eastman Gulch, through a ditch 1½ miles long; 2 men employed in the mine; the best ore has been worked; claim a production of $500,000; been worked since 1886; custom ore treated in this mill at present.

White Cloud Pocket, in Sec. 5, T. 34 N., R. 8 W., in the Lewiston mining district, 2 miles north of Lewiston. Owner, J. W. Phillips: comprises 40 acres, patented; small vein, in quartz-porphyry; 200-foot tunnel and 250 feet of drifts; worked for pockets; $2500 pocket extracted in 1912; idle at present.

Yellow Astor, in Secs. 29 and 21, T. 35 N., R. 11 W., in the East Fork mining district, 9 miles northeast of East Fork. Owner, East Fork Development and Mining Company, of Boulder Creek, Cal.; W. S.

G. Todd, president and manager; G. H. Aram, secretary; comprises 40 acres, located in 1905; 2 tunnels, 135 and 170 feet, also 45-foot shaft, all in ore; free milling and good grade; walls are dolomite and hornblende schist; fissure vein; some ore blocked out; closed down during the winter.

GOLD PLACERS—HYDRAULIC.

Bald Point, in Sec. 33, T. 33 N., R. 9 W., in the Lewiston mining district, 4 miles southwest of Lewiston. Owner, P. M. Paulsen; comprises 120 acres, patented, on the Trinity River; depth of gravel 20 feet; slate bedrock; water from Grass Valley Creek through a ditch 12 miles long; idle for several years; rich diggings worked in early days.

Bibl.: Report XII, p. 313; XIII, p. 459.

Bartel Jacobs, formerly known as Red Hill, in Secs. 1, 2, 34, 35 and 36, T. 33 and 34 N., R. 11 W., in the Junction City mining district, 1 mile north of Junction City. Owners, H. and J. Jacobs; comprises 390 acres, of which 249 acres are patented; slate bedrock; 30 feet of gravel; water from Connor Creek through a ditch 3 miles long; equipment: 2 giants, 1500 feet of pipe, dwelling; yearly production about $4000; only snort season due to litigation over water rights; famous property and said to have a large production record; only 25 acres have been worked, with large area still remaining.

Bates and Van Matre, in Sec. 33, T. 34 N., R. 8 W., in the Lewiston mining district, 4 miles north of Lewiston. Owner, Chinese Company, of San Francisco; comprises 20 acres, patented, on the Trinity River; diorite bedrock; depth of gravel, 20 feet; water from Mooney Gulch through a ditch 2 miles long; equipment, giant, 1000 feet of pipe, dwelling; idle since 1911; has been a good producer.

Bibl.: Report XIII, p. 438.

Beaudry, formerly known as Greenhorn Gulch, in Secs. 28, 29, 20, 32, 33, 5, 6, 7, 8 and 9, T. 35 N., R. 8 W., in the Minersville mining district, 4 miles north of Minersville, in the Trinity Reserve. Owner, L. E. Whipple, of Cleveland, Ohio; E. M. Gleason, watchman; comprises 600 acres, on east fork of Stewart's Fork; diorite bedrock; 20 to 60 feet of gravel; water from east fork of Stewart's Fork through a ditch 5 miles long; capacity, 2550 inches; equipment, 3 giants, 3000 feet of pipe, dwelling; watchman on property; idle since 1910 due to litigation, only assessment work being done; good ground, and good producer at one time.

Big Creek, in Secs. 7 and 8, T. 31 N., R. 11 W., in the Hay Fork mining district, 1 mile east of Hay Fork, in Trinity Reserve. Owner, Big Creek Placer Mining Company, of Oakland, Cal.; A. E. Dawson, president; J. A. Healewood, superintendent; comprises 58 acres, on Big Creek; slate bedrock; depth of gravel 40 feet; water from Big Creek and Hay Fork River, through 2 ditches, each 2 miles long; capacity, 600 inches; 2 giants, 1500 feet of pipe; dwelling; only worked on a small scale, due to lack of water.

Big East Fork, formerly known as Oswald, in Secs. 30 and 31, T. 35 N., R. 10 W., in the Canyon Creek mining district, 1 mile south of Dedrick. Owner, A. Dannenbrink; comprises 40 acres, patented, on east fork of Canyon Creek; slate bedrock; 20 feet of gravel; equipment: 3 giants, 1800 feet of pipe, dwelling; 2 miles of ditch; 3 men employed at present making repairs; coarse gold; small amount of platinum found; good producer.

Bloss and McClary, in Sec. 5, T. 36 N., R. 7 W., in the Trinity Center mining district, $\frac{1}{8}$ mile west of Trinity Center, in the Shasta Reserve. Owner, Sykes Mining Company, of Redding; L. McDonald, president; C. E. McDonald, secretary; comprises 136 acres, patented; elevation 2400 feet; bedrock, slate; depth of gravel 15 to 75 feet; water from Swift Creek through ditch 4½ miles long; capacity 3500 inches; head 300 feet; equipment: 3 giants, 2000 feet of pipe, and sluice boxes; 12 men employed when operating; rich benches; worked since the seventies and a good producer; under option to Alta Bert Dredging Company.

Bibl.: Report X, pp. 699–700; XII, p. 307; XIII, p. 439.

Blue Gravel, in Sec. 1, T. 31 N., R. 11 W., in the Hay Fork mining district, ½ mile east of Hay Fork, in the Trinity Reserve. Owner, D. E. Shack; comprises 40 acres, on Hay Fork Creek; slate bedrock; depth of gravel, 20 feet; water from Hay Fork River through a ditch 1 mile long; equipment: giant, 1000 feet of pipe, dwelling; small producer; idle on account of lack of water.

Blue Lead, in Secs. 6, 31 and 36, T. 33 and 34 N., R. 9 and 10 W., in the Weaverville mining district, 1½ miles north of Weaverville. Owner, T. I. Woodbury; comprises 160 acres; slate bedrock; depth of gravel, 60 feet; water from Garden Gulch through a ditch 1½ miles long; capacity 600 inches; equipment, 1 giant, 800 feet of pipe; idle; good producer at one time.

Bower & Matlock, in T. 31 N., R. 11 W., in the Hay Fork mining district, about 3½ miles southeast of Hay Fork, in the Trinity Forest Reserve. Owners, Bower & Matlock, of Red Bluff, Cal.; comprises 120 acres on east fork of Hay Fork; schist bedrock; depth of gravel, 25 feet; water from east fork of Hay Fork through a ditch 1 mile long; equipment: 2 giants, 1100 feet of pipe, dwelling; 2 men employed making repairs; short season due to lack of water; some good ground; small producer; 40 acres located as quartz claims.

Brown's Bar, formerly known as Hackerman Bar, in T. 7 N., R. 7 W., in the New River mining district, near Denny. Owner, Brackett and James Estate: comprises 140 acres: elevation 1950 feet; diabase bedrock; depth of gravel, 15 feet; water from Longtail Creek; equipment: giant, 900 feet of pipe, sawmill and dwelling; 2 men employed; small water supply, so only a few days' run each winter; gold coarse; worth $18 per ounce.

Burger, in Secs. 12 and 13, T. 34 N., R. 11 W., in the Junction City mining district, ½ mile west of Junction City. Owner, J. A. Burger; comprises 26 acres, of which 11 acres are patented; shale bedrock; depth of gravel, 30 feet; water from Gwin Gulch through Eagle and Empire ditch, 3 miles in length; capacity, 600 inches; head 120 feet; equipment: 1 giant and 1000 feet of pipe; good producer at one time. Idle.

Cacy, in Secs. 26 and 27, T. 32 N., R. 9 W., in the Indian Creek mining district, 5½ miles southeast of Douglas City. Owner, Indian Creek Placer Mining Company, of Weaverville; president and manager, H. M. Hall; comprises 65 acres, patented, on Indian Creek; slate bedrock; depth of gravel, 40 feet; water from Slate Creek through a ditch 1 mile long; idle at present; some good ground worked.

Cement and Mule Creek, formerly known as Mule Creek, in Secs. 30, 31 and 32, T. 35 N., R. 8 W., in the Minersville mining district, 1½ miles north of Minersville in the Trinity Forest Reserve. Owner, J. Skewis; comprises 150 acres, patented, slate bedrock; depth of gravel, 30 feet; water from Mule Creek through a ditch 1 mile long; capacity, 1000 inches; equipment: 2 giants, 1000 feet of pipe, dwelling; idle since 1911; 10 acres worked and over $200,000 produced.

Chapman & Fisher, formerly known as Gribble, in Secs. 18, 19, 29 and 30, T. 33 N., R. 10 W., in the Junction City mining district, 2 miles south of Junction City. Owners, Chapman & Fisher; comprises 213 acres, patented, on Trinity River; bedrock, diorite and slate; depth of gravel, 30 feet; water from Gribble and Oregon gulches, through a ditch 3 miles long; capacity, 600 inches; equipment: 2 giants, 1500 feet of pipe; dwellings; one of the best producers in this district; little platinum found, the amount decreasing last few years; worked during the winter months.

Bibl.: Reports X, p. 708; XIII, p. 442.

Clover, in Sec. 12, T. 37 N., R. 8 W., in the Trinity mining district, 1½ miles northwest of Carrville, in the Shasta Forest Reserve. Owner, A. M. Daly; comprises 106 acres; slate, bedrock; 25 feet of gravel; water from Coffee Creek through ½ mile of flume; 2 giants and 600 feet of pipe; produced about $200,000. Idle.

Corona de Oro, formerly known as the Upton, in the Lower Trinity mining district, in the Trinity Reserve. Nearest town is China Flat. Owner, Corona de Oro Mining Company, of Eureka, Humboldt County, Cal.; W. E. Olmstead, president; W. Taylor, secretary; slate bedrock; said to comprise 400 acres; water from Cedar and Hawkins Bar creeks, through a ditch 3½ miles long; equipment: giant, 300 feet of pipe, dwellings; said to have produced $1600 in eight days; 8 men employed at present, but over 40 at one time, constructing 6 miles of flume and ditch and 1100-foot tunnel, to bring water from Cedar Creek to the mine; good ground.

Curley, in Sec. 1, T. 31 N., R. 11 W., in the Hay Fork mining district, ¾ mile northeast of Hay Fork, in the Trinity Reserve. Owner, W. Leach; comprises 99 acres; slate bedrock; 25 feet of gravel; water from Hay Fork River, through Woodbury ditch 3 miles long, capacity 800 inches; equipment: 2 giants, 1600 feet of pipe, dwelling; only worked on a small scale, due to scarcity of water; small producer; some coarse gold.

Dannenbrink, in Sec. 12, T. 34 N., R. 11 W., in the Junction City mining district, 6 miles north of Junction City. Owner, C. Dannenbrink Estate; W. F. Dannenbrink, superintendent; comprises 39.94 acres; slate bedrock; depth of gravel, 30 feet; water from Gwin's Gulch, through a ditch 1 mile long; capacity 800 inches; equipment: 2 giants, 1000 feet of pipe, dwelling; 2 men employed making repairs, 6 during operating season; pays a dividend; operated from January to June.

Bibl.: Report XIII, p. 444.

Dolly Varden, in Sec. 9, T. 33 N., R. 10 W., in the Junction City mining district, 2 miles west of Junction City. Owners, Schaffer Brothers; comprises 50 acres; shale bedrock, tilted; 12 feet of gravel; water from Ox Canyon and Lime Kiln Gulch, through a ditch 1 mile long; equipment: 1 giant and 1000 feet of pipe, dwelling; operated during the winter; some good ground; producer.

Drinkwater, in Secs. 13 and 24, T. 31 N., R. 12 W., in the Hay Fork mining district, 2 miles south of Hay Fork, in the Trinity Reserve. Owner, Drinkwater Mining Company, of Oakland, Cal.; comprises 100 acres, on Kingsbury Gulch; schist bedrock; depth of gravel, 20 feet; water from Kingsbury Gulch, through 2 ditches each 2 miles long; capacity, 600 inches; equipment: 2 giants, 2000 feet of pipe, dwelling; operated on a small scale during the winter, due to poor water supply; some good gravel; small producer.

Driver, in Sec. 15, T. 33 N., R. 10 W., in the Weaverville mining district, 2 miles southwest of Weaverville. Owner, G. D. Young;

comprises 160 acres; grano-diorite bedrock; gravel 40 feet deep; water from Dutton's Creek, through a ditch 1 mile long; small producer. Idle at present.

East Fork, in Secs. 1, 2, 11 and 12, T. 36 N., R. 7 W., in the Trinity Center mining district, 3½ miles east of Trinity Center, in the Shasta Reserve. Owners, M. MacWaine et al., comprises 520 acres on east fork of Trinity River; bedrock slate; depth of gravel, 15 to 60 feet; water from east fork of Trinity River, through a ditch 3 miles long; capacity, 1000 inches; head, 300 feet; equipment: 3 giants, 2500 feet of pipe; dwelling; 10 men employed when in operation; benches, rich in places; producer.

Eastman, in Secs. 33 and 34, T. 34 N., R. 8 W., in the Lewiston mining district, 4 miles north of Lewiston. Owners, Jim Sing et al Comprises 114 acres, patented, on Trinity River at mouth of Eastman Gulch; diorite bedrock; depth of gravel, 30 feet; water from Eastman Gulch through a ditch 5 miles long; capacity 1000 inches; equipment, 2 giants, 2000 feet of pipe, derrick and dwelling; 3 Chinese employed; good producer; been worked for years; sold recently to a San Diego company.

Bibl.: Report XIII, p. 451.

Evans Bar, in Sec. 32, T. 33 N., R. 10 W., in the Junction City district, 5 miles south of Junction City. Owners, Carr Brothers. Comprises 70 acres, patented; slate bedrock; depth of gravel 30 feet; equipment, 2 giants, 1500 feet of pipe; good producer at one time. Idle at present.

Bibl.: Report XIII, p. 446.

Garden Gulch, in Secs. 1, 12, and 36, T. 33 and 34 N., R. 10 W., in the Weaverville mining district, 1 mile north of Weaverville. Owners, J. A. Wallace et al. Comprises 107 acres on Weaver Creek; water obtained through a ditch 2 miles long; capacity 1000 inches; equipment, 2 giants, 2500 feet of pipe, dwelling; 4 men employed at present making repairs, and 10 during operating season; dividend payer; some good ground.

Gem, formerly known as the Scharber, in the Lower Trinity mining district, in Trinity Forest Reserve. Owners, Teal and Perigot. Comprises 400 acres, patented, on the Trinity River; nearest town, China Flat; water from Scharber and Quimby creeks; slate bedrock; depth of gravel, 30 feet; equipment, 3 giants, 4000 feet of pipe, buildings, sawmill; 2 reservoirs; 6 men employed when in operation, from December to June; gold worth $18.50 per ounce; black sands carry a little platinum; producer.

Gold Dollar, in Sec. 33, T. 33 N., R. 9 W., in the Lewiston mining district, 4 miles southwest of Lewiston. Owner, Last Chance Mining Company, of Weaverville. Comprises 50 acres, patented, on the Trinity River; slate bedrock; depth of gravel, 20 to 100 feet; some cemented gravel 3 feet thick and boulders; water from Grass Valley Creek through a ditch 10 miles long; capacity, 2500 inches; equipment, 2 giants and 1500 feet of pipe. Idle. Good producer at one time.

Haas, in Secs. 7 and 12, T. 33 N., R. 10 and 11 W., 1 mile west of Junction City, in the Trinity Reserve. Owner, F. G. Haas. Comprises 102 acres on Trinity River; shale bedrock; depth of gravel 10 to 40 feet; water from Black's Gulch through a ditch 1 mile long; equipment, 2 giants, 1500 feet of pipe, dwelling; worked on a small scale; rich gravel taken out at times from old bench.

Bibl.: Reports X, p. 703; XII, p. 311; XIII, p. 448.

Hager & Haas, in Secs. 7 and 18, T. 33 N., R. 10 W., in the Junction City mining district, 1½ miles east of Junction City. Owners, Hager & Haas. Comprises 159 acres, patented, on Trinity River; elevation 1700 feet; shale bedrock; depth of gravel 10 to 30 feet; water from Black's Gulch through ditch 7 miles long; capacity 1800 inches; head 250 feet; equipment, 3 giants, 3500 feet of pipe, dwelling; yearly production from $5000 to $7000; operating cost yearly $2500; some good ground; worked from January to June.

Hang Bar, in Sec. 36, T. 31 N., R. 11 W., in the Hay Fork mining district, 4 miles southeast of Hay Fork, in the Trinity Forest Reserve. Owner, Chinese Company. Comprises 40 acres; schist bedrock; depth of gravel, 20 feet; water from east fork of Hay Fork River through a ditch 4 miles long; capacity 1600 inches; equipment, giant and 2000 feet of pipe; water supply limited; produces about $3000 per year; 3 Chinese employed.

Happy Home, in Sec. 30, T. 35 N., R. 10 W., in the Canyon Creek mining district, ½ mile south of Dedrick. Owner, F. Heurtevant. Comprises 50 acres on east fork of Canyon Creek; elevation 2400 feet; slate bedrock; 15 to 30 feet of gravel; ditch 2 miles long; produced over $400,000 from 25 acres; 3 benches; considerable coarse gold. Idle.

Haskins, formerly known as *Hatchet Creek* and *Shoo Fly,* Trinity Center mining district, ½ mile north of Trinity Center, in the Shasta Reserve. Owner, F. Petra. Comprises 128 acres, of which 53 acres are patented; slate bedrock; depth of gravel 20 to 30 feet; water from Buckeye Creek through a ditch 6 miles long; capacity 500 inches; head 150 feet; equipment, 2 giants and 1000 feet of pipe; good producer at one time. Idle at present, and only assessment work performed last few years.

Bibl.: Report XIII, p. 448–449.

Hawkins Bar, formerly known as *Trinity River Hydraulic Gold Mine,* in Secs. 28 and 29, T. 6 N., R. 6 E., in the lower Trinity mining district, in the Trinity Forest Reserve. Nearest town, China Flat. Owner, J. Smith. Comprises 340 acres, patented; located in the sixties; slate bedrock; depth of gravel 28 to 38 feet; water from Hawkins Bar Creek, through 5 ditches, having a total length of 2½ miles; equipment, giant, 1800 feet of pipe, buildings; idle since 1909; some good ground; gold worth $18.25 an ounce; a little platinum.

Bibl.: Report XIII, p. 449.

Henderson, in Sec. 13, T. 6 N., R. 5 E., 8 miles from China Flat, in the Lower Trinity mining district, in the Trinity Reserve. Owners, Ferguson and Henderson. Comprises 60 acres on Trinity River; located in 1896; slate bedrock; depth of gravel 25 feet; equipment, giant, 800 feet of pipe, 2 buildings; water from west fork of Sharburo Creek; a little platinum with the gold; small producer; bonded in 1912; adjoining mines, Top Notch and Gem.

Hook and Ladder, in Secs. 5 and 6, T. 33 N., R. 9 W., in the Weaverville mining district, 1 mile north of Weaverville. Owners, B. R. Rule et al. Comprises 124 acres; slate bedrock; depth of gravel 35 feet; water from Rush Creek through a ditch 8 miles long; capacity 600 inches; equipment, 1 giant, 1000 feet of pipe, dwelling; 2 men employed repairing ditch; yearly production about $7000 and operating costs about $2200.

Horseshoe and Homestake, formerly known as the Testy, in Sec. 18, T. 33 N., R. 9 W., ½ mile south of Weaverville, has been a good producer of placer gold for a number of years. Owner, Homestake-Ellerbrook Consolidated Mining Company, of Weaverville; W. B. Testy, president; A. J. Testy, secretary and superintendent. Comprises 170 acres; slate bedrock; depth of gravel 30 feet; use surplus water from La Grange ditch, and water from Cooper, Watson, Kenkaid and Gold Run gulches; 1 mile of ditch; capacity 300 inches; equipment, giants and 1000 feet of pipe; worked during the winter; producer.

Hydraulic Hill, in Sec. 29, T. 34 N., R. 11 W., in the North Fork mining district, in the Trinity Reserve. Owners, Lorenz Brothers. Comprises 35 acres; slate bedrock; depth of gravel 45 feet; water from Logan's Gulch through 1 mile of ditch; good producer at one time; coarse gold; only 5 acres worked. Idle.

Indian Creek and Panwocket, in Secs. 23, 26, 27 and 28, T. 32 N., R. 9 W., in the Indian Creek mining district, 4 miles southeast of Douglas City. Owner, Dr. D. B. Fields. Comprises 1667 acres, 345 acres being patented; sandstone bedrock; depth of gravel 30 to 50 feet; idle, as no water on claims, as old ditch from Indian Creek has been destroyed; some good ground.

Ingleside, in Secs. 27 and 28, T. 35 N., R. 8 W., in the Minersville mining district, 2 miles north of Minersville, in the Trinity Reserve. Owner, G. A. Seward. Comprises 60 acres; water from east fork of Stewart's Fork through a ditch 6 miles long; capacity 700 inches; elevation 2300 feet; diorite bedrock; depth of gravel 30 feet; equipment, 2 giants, 700 feet of pipe, dwelling; producer at one time; only assessment work performed.

Jacob, in Secs. 34 and 35, T. 34 N., R. 11 W., in the Junction City mining district, 2 miles north of Junction City. Owner, H. Jacob. Comprises 71 acres, patented; shale, bedrock; depth of gravel 15 to 40 feet; water from Connor Creek through a ditch 3 miles long; equipment, giant, 1000 feet of pipe, dwelling; worked on small scale; some good gravel; not sufficient water for a season's run.

Bibl.: Report X, p. 707; XIII, p. 450.

Joss, in Secs. 18 and 7, T. 33 N., R. 9 W., in the Weaverville mining district, 2 miles southeast of Weaverville. Owner, W. S. Lowden. Comprises 139 acres; slate bedrock; depth of gravel, 40 feet; water from Rush Creek through a ditch 12 miles long; equipment, giant and 1000 feet of pipe; idle; some good ground; has been a producer.

King, formerly known as *King and Bayles,* in the Trinity Reserve, on Rattlesnake Creek. Owners, King et al., of Helena. Slate bedrock; water from Rattlesnake Creek; 15 feet of gravel; 1 giant and pipe. Three men employed during operating season, lasting about four months. Coarse gold.

La Grange, formerly known as the *Ward and Trinity,* is the largest hydraulic mine in the world in active operation. It is located in Secs. 1, 12, 36, 9, 32, 6, 7, 2, 3, 11, 31, 10, 28, 29, 33, 20 and 13, T. 33 and 34 N., R. 9 and 10 W., in the Weaverville mining district, 2½ miles west of Weaverville, the county seat. It is owned by the La Grange Hydraulic Mining Company, a French syndicate. P. Bouery, manager; C. Jansen, foreman. Comprises 3,000 acres, 1200 being patented. Elevation 2200 to 3500 feet. Bedrock is slate, tilted and soft in spots; gravel bank in places is 500 feet high; loose, with some boulders; water is obtained from Stewart's Fork and Rush Creek, through 27 miles of ditches and flumes; capacity, 12000 inches; head 400 feet. Equipment very complete, consisting of several giants, pipe, sluice-boxes, electrical plant, ice plant, sawmill, shops, dwellings, and 32 miles of telephone line; sluice-boxes are 3000 feet long, 5 feet wide and 4 feet deep; iron rails, set 4 inches apart, are used for riffles; handle 1100 cubic yards of gravel per hour. Thirty men are employed all year around; more men employed when in operation, the season lasting ten months. Some of the giants are not moved for several months, due to size of the banks. Good dividend payer.

Bibl.: Report VIII, p. 638; X, p. 702; XII, p. 311; XIII, p. 452; U. S. G. S. Bulls. No. 430, pp. 51–56; No. 470, pp. 16–18· No. 540, p. 19.

Larsen, formerly known as *Mason Bar and China Creek,* in New River mining district, near Quimby, in the Trinity Reserve. Owners, Larsen Brothers. Comprises 40 acres; bedrock granite; depth of gravel 10 to 30 feet; water from China Creek. Equipment: giant, 800 feet of pipe, dwelling. Four men employed. Operated during the winter. Produced about $10,000 to date; gold is coarse and worth $18 per ounce. Small producer.

Little Joe, in Sec. 25, T. 32 N., R. 9 W., in the Indian Creek mining district, 6 miles southeast of Douglas City. Owners, Rogers Brothers. Comprises 40 acres. Slate bedrock; depth of gravel 5 to 20 feet; water from Indian Creek, through a ditch 2½ miles long; 1 giant and 1000 feet of pipe, dwelling. Producer at one time. Idle.

Log Cabin Bar, in T. 7 N., R. 7 E., in the New River mining district, in the Trinity Reserve. Owner, F. Staley. Quimby nearest town. Comprises 40 acres, located in 1904. Granodiorite bedrock; depth of gravel, 40 feet; water from Log Cabin Gulch; 1 giant, 400 feet of pipe, dwelling. Fine gold, worth $17.50 per ounce; a little platinum. Small producer. Limited water supply, hence a short operating season.

Long Gulch, in Sec. 17, T. 35 N., R. 8 W., in the Minersville mining district, 2 miles northeast of Minersville, in the Trinity Forest Reserve. Owner, F. Beaudry Estate. Comprises 120 acres, patented. Slate bedrock; depth of gravel, 50 feet. Equipment: 3 giants, 1000 feet of pipe, dwelling. Idle. Rich ground worked in early days.

Lower Buckeye, in Secs. 19, 30 and 29, T. 37 N., R. 7 W., in the Trinity mining district, 2 miles north of Trinity Center, in the Shasta Reserve. Owner, Trinity Gold Mining Company, of Ohio; E. A. Ellston, president. Comprises 140 acres on Buckeye Creek. Slate bedrock; 30 feet of gravel; water from Buckeye Creek through a ditch 2 miles long; capacity 300 inches; head 140 feet. Equipment: 2 giants and 800 feet of pipe. Some good gravel. Idle since 1911.

Lower Dutton's Creek, in Secs. 26 and 35, T. 33 N., R. 10 W., in the Indian Creek mining district, 3 miles north of Douglas City. Owners, Lorenz Brothers. Comprises 785 acres. Slate bedrock; depth of gravel, 50 feet; water from Dutton's Creek through a ditch 2 miles long. Equipment: 2 giants, 1500 feet of pipe, dwelling. Two men employed making repairs; 6 men used during operating season. Good producer; said to have produced at least $300,000 to date.

Lucky Strike and Effie Belle, in Sec. 24, T. 33 N., R. 10 W., in the Weaverville mining district. 4 miles southeast of Weaverville. Owner, J. Armentrout. Comprises 80 acres. Slate bedrock; depth of gravel, 30 feet; water from Democrat Gulch, through a ditch 1 mile long. Equipment: giant and 800 feet of pipe. Coarse gold found. Idle last two years.

McAtee Bar, in T. 7 N., R. 7 E., in the New River mining district, in the Trinity Reserve. Owner, C. S. McAtee. Comprises 60 acres, one location, the Kuntz, being made in 1853. Nearest town, Quimby. Granite bedrock; 15 feet of gravel. Equipment: 1 giant, 400 feet of pipe, 2 small reservoirs, dwelling. One man employed; working season lasts forty days. Fine gold worth $17.75 per ounce. Small producer.

Maple Creek, in Secs. 4, 5, 6, 8, 29, 30, 32 and 33, T. 32 N., R. 10 W., in the Junction City mining district, 4 miles south of Junction City. Owner, Maple Creek Mining Company, of San Francisco; F. L. Keller, superintendent. Comprises 1594 acres, of which 198 acres are patented. Bedrock, slate and diorite; depth of gravel, 25 feet; water from Dutch Creek, through a ditch 3 miles long. Equipment, 3 giants, 2000 feet of pipe, dwellings. Four men employed. Producer. Operated during the winter.

Meckel, in Secs. 13 and 14, T. 33 N., R. 10 W., in the Weaverville mining district, 1 mile southeast of Weaverville. Owners, Meckel Brothers; comprises 180 acres; diorite bedrock; depth of gravel, 20 to 100 feet; water from Democrat Gulch, through a ditch 2 miles long; capacity, 300 inches; equipment: 3 giants, 1500 feet of pipe, dwelling; 2 men employed making repairs, and 8 men during operating season; good producer; some coarse gold.

Miller, in Sec. 33, T. 34 N., R. 11 W., in the North Fork mining district, ½ miles south of North Fork. Owner, C. Miller; comprises 40 acres; equipment: 2 giants, 1000 feet of pipe, dwelling; some coarse gold; yearly production about $2000. Idle in 1912.

Monk, in Sec. 5, T. 32 N., R. 9 W., in the Indian Creek mining district, 1 mile east of Douglas City. Owner, W. Brannan; comprises 30 acres on Indian Creek; slate bedrock; depth of gravel, 5 to 20 feet; equipment: 2 giants, 1000 feet of pipe, dwelling; producer at one time; idle at present.

Morrison Gulch, in Secs. 12 and 13, T. 37 N., R. 8 W., in the Trinity Center mining district, 2 miles northwest of Carrville, in the Shasta Reserve. Owner, C. Hilton; comprises 76 acres, patented, on Coffee Creek; slate bedrock; 25 to 30 feet of gravel; water from Little Boulder Creek, through 1½ miles of ditch; equipment: 2 giants, 1500 feet of pipe, dwelling; 8 men employed during the season; good producer.

Montezuma, in Secs. 1, 2, 11 and 12, T. 33 N., R. 11 W., in the Junction City mining district, 1 mile north of Junction City. Owner, T. F. Bergin; comprises 77 acres, patented; slate bedrock; depth of gravel, 30 to 40 feet; producer at one time, but ground can not be worked any more on account of lack of water; area worked, 10 acres.

Nash, in Secs. 6, 7, 8, 28, 29, 30 and 31, T. 37 and 38, R. 9 W., in the Trinity Center mining district, 12 miles northwest of Carrville, in the Shasta Reserve. Owners, Trinity Hydraulic Gold Mining Company, Ltd., of London, England; G. Abrams, superintendent; comprises 474 acres, patented, on Coffee Creek; slate bedrock; 15 to 30 feet of gravel; water from Coffee Creek, through 3-mile ditch; capacity, 3000 inches; head 200 feet; equipment: hydraulic elevators, 5 giants, 2500 feet of pipe, dwellings, derrick; 8 men employed at present and 15 during the operating season; good producer; company also owns the ''Abram & Blythe'' placer properties, which are not worked.

Bibl.: Report XIII, pp. 464–465.

New River Placer, in Sec. 13, T. 6 N., R. 5 E., in the New River mining district, in the Trinity Forest Reserve. Owner, New River Mining Company, of Bakersfield, Cal.; nearest town, Quimby; elevation, 1650 feet; comprises 130 acres on Quimby Creek; granitic-porphyry bedrock; depth of gravel 22 feet; equipment: 2 giants, 600 feet of pipe, sawmill and 5 buildings; 12 men employed when in operation; coarse gold, worth $18.35 per ounce; a little platinum; season lasts 8 months; total operating costs 7 cents per yard; ''high-line'' ditch; producer.

Nigger Hill, in Sec. 2, T. 32 N., R. 10 W., in the Indian Creek mining district; 1½ miles northwest of Douglas City. Owner, G. Lewman; comprises 40 acres; elevation, 1700 feet; diorite bedrock; 30 feet of gravel; water from Dutton's Creek, through a ditch 3 miles long; capacity, 500 inches; equipment: 2 giants, 1000 feet of pipe, dwelling; 2 men employed, and 6 during operating season; producer.

O'Connell, in Sec. 33, T. 32 N., R. 9 W., in the Indian Creek mining district; 5 miles southeast of Douglas City. Owner, William Wallace; comprises 80 acres on Reading's Creek; slate bedrock; depth of graven, 5 to 20 feet; water from Reading's Creek, through a ditch ¾ mile long; capacity, 500 inches; equipment: 2 giants, 800 feet of pipe, dwelling; 2 men employed, making repairs; when in operation, 6 to 8 men employed; producer.

Potilla, in Sec. 11, T. 33 N., R. 10 W., in the Weaverville mining district, 1 mile west of Weaverville. Owner, F. Potilla; comprises 30 acres, on Grub Gulch; slate bedrock; depth of gravel, 20 feet; water from Grub Gulch, through a ditch 1½ miles long; equipment: giant and 800 feet of pipe; small producer; best values on bedrock.

Post & Wilson, formerly known as *Good Friday,* in Secs. 19 and 20, T. 33 N., R. 11 W., in the Junction City mining district, 2 miles south of Junction City. Owners, Post & Wilson; comprises 160 acres on Trinity River; slate bedrock; 25 to 50 feet of gravel; equipment: 2 giants and 1500 feet of pipe; some good ground; worked during winter; producer.

Potter & Humboldt, in Secs. 1, 6, 2, 5, 7 and 12, T. 34 N., R. 8 and 9 W., in the Minersville mining district, 2 miles southwest of Minersville, in the Trinity Forest Reserve. Owner, Humboldt Placer Mining Company, of Blocksburg, Humboldt County; W. Stowers, superintendent; comprises 1270 acres on Stewart's Fork; slate bedrock; depth of gravel, 20 to 60 feet; water from Stewart's Fork, through a ditch 1 mile long; capacity, 2000 inches; equipment; 3 giants, 2000 feet of pipe, dwelling; 2 men employed; good ground; producer; worked during the winter.

Poverty Flat, in Secs. 18 and 19, T. 33 N., R. 9 W., in the Weaverville mining district, 3½ miles southeast of Weaverville. Owners, Lorenz Brothers. Comprises 30 acres, patented; diorite bedrock; 20 to 30 feet of gravel; equipment: two giants, 1000 feet of pipe, dwelling; water from Brown's Creek through a ditch 6 miles long; capacity, 600 inches; operated during the winter; producer.

Quimby, in Sec. 18, T. 6 N., R. 6 E., in the Lower Trinity mining district, in the Trinity Reserve. Owners, Ferguson and Ziegler; nearest town, China Flat; comprises 100 acres, located in the early fifties; slate bedrock; depth of gravel, 25 feet; some cemented; scale—gold worth $18.50 per ounce; a little platinum; under option to Perigot and is to be drilled for dredging.

Bibl.: Report XIII, p. 460.

Railroad and Mt. Morensis, in Secs. 9, 15 and 16, T. 33 N., R. 10 W., in the Junction City mining district, 2 miles southwest of Junction City. Owners, Schaffer Brothers. Comprises 307 acres, patented, on the Trinity River; slate bedrock; depth of gravel, 30 feet; 2 giants, 600 feet of pipe; producer at one time; idle since 1910.

Red Flat, in Sec. 12, T. 34 N., R. 11 W., in the Canyon Creek mining district, 4 miles south of Dedrick, in the Trinity Reserve. Owner, Dannenbrink Estate. Comprises 55 acres, patented; slate bedrock 25 feet of gravel; water from Gwin Gulch through 2-mile ditch; capacity, 1500 inches; head, 150 feet; equipment: 2 giants, 1500 feet of pipe, dwelling; yearly production from $6000 to $10,000; total operating cost $2500; idle at present.

Roe, in Secs. 1, 6 and 31, T. 32 and 33 N., R. 9 and 10 W., in the Indian Creek mining district, 1 mile east of Douglas City. Owner, C. E. Thayer. Comprises 36 acres, patented; slate bedrock; depth of gravel, 25 feet; water from Weaver Creek through a ditch 5 miles long; capacity 600 inches; has been a good producer; idle.

Schloner, formerly known as the Rittubush, in Sec. 28, T. 33 N., R. 11 W., in the North Fork mining district, in the Trinity Reserve. Owners, H. C. Schloner et al.; comprises 88 acres, located in the fifties; depth of gravel, 10 to 40 feet; slate bedrock; old bench; water from North Fork Gulch; best pay gravel last 3 feet above bedrock; equipment: 2 giants, 1200 feet of pipe, sluice-boxes and dwellings; 2 men employed; yearly production, $1500 to $3000; gold worth $18 per ounce; some platinum; worked during the winter season.

Senger, in Secs. 12 and 13, T. 33 N., R. 10 W., in the Weaverville mining district; ¼ mile south of Weaverville. Owner, J. Senger. Comprises 60 acres; grano-diorite bedrock; depth of gravel, 20 feet; water from West Weaver Creek through a ditch ½ mile long; equipment: giant and 1000 feet of pipe; good producer at one time; worked on a small scale during the winter.

Sheridan, in Secs. 18 and 19, T. 33 N., R. 10 W., in the Junction City mining district, 1 mile south of Junction City. Owner, W. J. Dyman. Comprises 104 acres, patented; shale bedrock; depth of gravel, 25 feet; water from Simpson's Gulch through a ditch 1 mile long; head, 200 feet; capacity, 750 inches; equipment: 2 giants, 1600 feet of pipe, dwelling; 2 men employed and 6 when in operation; production yearly about $5000; profit $3000; worked from January to May.

Bibl.: Reports XII, p. 313; XIII, p. 462.

Slate Creek, in Secs. 2 and 3, T. 34 N., R. 9 W., in the Minersville mining district, 3 miles southwest of Minersville, in the Trinity Reserve. Owner, F. Cadematori. Comprises 120 acres on Slate Creek; slate bedrock; depth of gravel, 40 feet; water from Slate Creek through a ditch 1 mile long; capacity, 500 inches; equipment: giant, 500 feet of pipe, dwelling; idle; only do assessment work.

South Fork, in Secs. 22, 23, 14 and 15, T. 6 N., R. 5 E., in the Lower Trinity mining district, in the Trinity Reserve; nearest town, China Flat, Humboldt County. Owner, South Fork Gold and Platinum Mining Company; P. P. Hammer, president; J. Kahlker, secretary. Comprises 885 acres on Trinity River; equipment: giant, 600 feet of pipe, dwelling; 1 man employed; fine gold, and black sands carry a little platinum; property involved in litigation; depend on rains for water supply; small producer.

Sowden, in Sec. 2, T. 33 N., R. 10 W., in the Weaverville mining district, 1¾ miles northwest of Weaverville. Owners, Ah Fong et al. Comprises 40 acres on Weaver Creek; slate bedrock; depth of gravel, 40 feet; water from West Weaver Creek through a ditch 1 mile long;

equipment: giant and 1000 feet of pipe; 2 Chinese employed; small producer.

Steiner's Flat, formerly known as Hurst and Eliason, in Secs. 35 and 36, T. 33 N., R. 10 W., in the Indian Creek mining district, 2 miles north of Douglas City. Owner, J. H. Lorenz. Comprises 180 acres, patented; slate bedrock; depth of gravel, 30 feet; water from Dutton's Creek, through a ditch 2 miles long; capacity, 600 inches; equipment: 2 giants, 1500 feet of pipe, dwelling; 3 men employed and 8 during operating season; production yearly from $4000 to $10,000; some good ground; old producer; gold worth $17.50 per ounce.

Sturdivant, in Secs. 7 and 8, T. 33 N., R. 10 W., in the Junction City mining district, 1½ miles east of Junction City. Owner, Trinity Gold Mining Company, of San Francisco; comprises 55 acres, patented, along the Trinity River; shale bedrock; depth of gravel, 15 to 35 feet; some coarse gold found; idle.

Ten Cent Gulch, in Secs. 6 and 31, T. 33 and 34 N., R. 9 W., in the Weaverville mining district, 2 miles northeast of Weaverville. Owner, M. L. Woodbury. Comprises 69 acres, patented, at an elevation of 2400 feet; slate bedrock; depth of gravel, 20 feet; water from East Weaver Creek through a ditch 2 miles long; equipment: 1 giant, 1000 feet of pipe, dwelling; leased to Chinese company; Sing Lee, manager; 2 Chinese employed; small producer; about 10 acres has been worked; some good ground.

Tener, in Sec. 30, T. 8 N., R. 8 E., in the New River mining district, in the Trinity Reserve. Owners, W. L. and R. W. Tener. Comprises 240 acres; slate bedrock; depth of gravel, 25 feet; water from Slide and Emigrant Creeks, through flume 1½ miles long and 1000 feet of ditch; equipment: 2 giants, 1600 feet of pipe, sawmill, buildings, derrick; 25 men employed installing equipment; 6 prospect shafts have been sunk to bedrock and good pay found; new location; going to work bottom of Slide Creek.

Texas Bar, in Sec. 6, T. 32 N., R. 9 W., in the Indian Creek mining district, ½ mile north of Douglas City. Owner, G. Vitzthum. Comprises 50 acres; slate bedrock; depth of gravel, 5 to 20 feet; water from Indian Creek through a ditch 3 miles long; equipment: 3 giants, 1500 feet of pipe, dwelling; 2 men employed making repairs, and 8 men during operating season; good producer.

Tolly Hill, in Sec. 34, T. 35 N., R. 9 W., in the Minersville mining district, 3 miles west of Minersville, in the Trinity Reserve. Owner, J. H. Cummings. Comprises 160 acres, on Bear Gulch; slate bedrock; depth of gravel, 50 feet; water from Bear Gulch through a ditch 1½ miles long; capacity 40 inches; equipment—giant and 700 feet of pipe; idle; producer at one time.

Top Notch, in Secs. 12 and 13, T. 6 N., R. 5 E., in the Lower Trinity mining district, 8 miles from China Flat, in the Trinity Reserve. Owners, Ranny and Holliday. Comprises 160 acres, located in 1905; slate bedrock; depth of gravel, 30 feet; water from west branch of Sharber's Creek through a ditch 1 mile long; capacity 500 inches; equipment—giant, 800 feet of pipe, dwelling; fine gold, valued at $18.57 per ounce; 1 ounce of platinum to 6 of gold; use the outfit owned by the Henderson mine; worked during the winter; small producer; adjoins the Henderson, Gem, and Negunda.

Trinity Consolidated Hydraulic, in Secs. 1, 3, 7, 18, 8, 31, 6, 14, 32, 33, 2, 35 and 36, T. 33 N., R. 8, 9 and 10 W., in both Weaverville and Indian Creek mining districts, near the towns of Weaverville and Douglas City. Owner, Trinity Consolidated Hydraulic Mining Company, an eastern corporation; general manager, D. W. Shanks, of Weaverville; J. Murphy, superintendent; comprises 2420 acres, of which 700 are patented; slate and diorite bedrock; length along channel, 3 miles; depth of gravel, 50 to 400 feet; water from east Weaver Creek, through the old Cooper and Watson Ditch; also from east fork of Weaver Creek, through Sloan ditch; also from Grider Gulch; total length of ditches, 22 miles, capacity, 5000 inches; equipment: giants, several thousand feet of pipe, 1000 feet of 22-inch siphon and 500-feet suspension bridge, dwellings; 15 men employed at present; 40 men during the operating season; ranks next to the La Grange as a hydraulic mine; consolidation of several famous properties such as the Union Hill, McMurray and Hupp, Red Point, Bartolet, Douglas City, Ford & Foley and Harvey; good producer; several millions produced from these old holdings.

Bibl.: U. S. G. S. Bulls. No. 430, pp. 51–56; No. 470, pp. 16–18; No. 540, pp. 18–19.

Trinity River Mining Company, in Secs. 5 and 8, T. 33 N., R. 8 W., in the Lewiston mining district, 1½ miles north of Lewiston. Owner, Trinity River Mining Company, of Oakland; Charles Heyer, president; W. R. Thomas, secretary; under lease to Horseshoe Placer Mining Company; W. E. Procter, superintendent; comprises 600 acres, of which 103 acres are patented, on Trinity River; diorite bedrock; depth of gravel, 30 to 40 feet; waterpower obtained from Trinity, through a tunnel 1400 feet long, 12 feet wide and 10 feet high; equipment: Hendy 24-inch pump, turbine water wheel (1000 h.p.), rope transmission, 2200 feet of pipe, dwellings; water pumped from tunnel into elevated sluiceboxes; 12 men employed; rich diggings on the blue channel in early days; leasing company constructing concrete dam, 340 feet long, 3 feet on bottom, 6 feet on top, and 18 feet deep, to divert all of the water in the Trinity River through the tunnel, so as to work the bed of this stream; holding company began work in 1905 and spent $142,000; tunnel cost $54,000 (all hand work); no production as yet; some good ground, going better than $20 per cubic yard, has been worked on the "blue lead," a noted pay channel.

Bibl.: U. S. Geol. Sur. Bull. No. 540, p. 20.

Valdor, formerly known as Huertevant, in Secs. 1, 2, 26, 27, 34. 35 and 36, T. 33 and 34 N., R. 11 W., in the Junction City mining district, 1½ miles north of Junction City. Owner, M. Huertevant; comprises 845 acres, of which 786 acres are patented; schist bedrock; depth of gravel, 30 feet; water from Conner and Cannon creeks, through 2 ditches, one 3 miles long and the other 7 miles; equipment: 2 giants, 150 feet of pipe, dwellings; being prospected for dredging possibilities by W. Johnson; 5 men employed; land under bond to McCray et al.; said to be good dredging ground; producer.

William Morris, in Sec. 25, T. 32 N., R. 9 W., in the Indian Creek mining district, 5¾ miles southeast of Douglas City. Owners, William Morris et al.; comprises 80 acres, patented; slate bedrock; 5 to 20 feet of gravel; water from Kline Creek, through ditch ½ mile long; capacity, 200 inches; equipment: giant and 800 feet of pipe; water supply limited; small producer.

Woodbury, formerly known as MacParlane, in Sec. 35, T. 31 N., R. 11 W., in the Hay Fork mining district, 3 miles southeast of Hay Fork, in the Trinity Reserve. Owner, Chinese Company, of Hay Fork; comprises 40 acres; schist bedrock; depth of gravel, 20 feet; water from Hay Fork Gulch through a ditch 4½ miles long; capacity, 1200 inches; equipment: 2 giants and 1000 feet of pipe; worked on a small scale; poor water supply; good ground; small producer.

GOLD PLACERS—GROUND SLUICING.

Blue Jib, in Sec. 13, T. 37 N., R. 8 W., in the Trinity Center mining district, 1½ miles northwest of Carrville, in the Shasta Forest Reserve. Owners, Graves & Carter; comprises 20 acres on Coffee Creek; slate bedrock; depth of gravel, 20 feet; water from Coffee Creek, through a ditch ½ mile long; small reservoir; small producer; some good ground; worked during the winter.

Boyd, in Sec. 28, T. 8 N., R. 8 E., in the New River mining district, 1 mile south of Denny, in the Trinity Reserve. Owner, A. Boyd; comprises 20 acres, on Emigrant Creek; schist bedrock; depth of gravel, 10 feet; water from Emigrant Creek, through a ditch ½ mile long; equipment: 500 feet of pipe and dwelling; small producer; coarse gold

Haunted Bar, on Eagle and Slide creeks, in New River mining district, in Trinity Reserve. Owner, J. L. Mushick; comprises 100 acres; 900 feet of ditch and dwelling; coarse gold; a little platinum; worked nine months of the year; small producer.

Lucky Strike, on east fork of New River, about 2½ miles above the mouth of Pony Creek, in the New River mining district, in the Trinity Reserve. Owner, C. Schwelder; comprises 60 acres; schist bedrock; 15 feet of gravel; ½-mile ditch; small producer.

Negunda, in Sec. 12, T. 6 N., R. 5 E., in the Lower Trinity mining district; post office, Burnt Ranch. Owner, H. Zeigler; works bed of slough; small producer.

Stribbling, in North Fork mining district, on Grizzly Creek. Owner, P. T. Stribbling; comprises 40 acres; grano-diorite bedrock; coarse gold; small producer.

GOLD PLACERS—DRIFT.

Buckeye, in Sec. 19, T. 37 N., R. 7 W., in the Trinity Center mining district, 3 miles northwest of Trinity Center, in the Shasta Reserve. Owner, J. Larson; comprises 40 acres, on Buckeye Creek; slate bedrock; depth of gravel 50 feet; tunnel 60 feet long, 4 feet by 7 feet; worked on small scale; good ground.

Ellston, formerly known as Self-Shooter, in Sec. 7, T. 36 N., R. 12 W., in the New River mining district, 2 miles south of Denny, in the Trinity Reserve. Owner, R. Ellston; comprises 20 acres on Emigrant Creek, slate bedrock; depth of gravel, 20 to 60 feet; tunnel, 50 feet long, 5 feet by 7 feet; some coarse gold found; small producer.

Graves, in Secs. 29 and 30, T. 37 N., R. 7 W., in the Trinity Center mining district, 3 miles north of Trinity Center, in the Shasta Reserve. Owner, Trinity Exploration Company, of Carrville; D. Goodale, superintendent and manager; comprises 350 acres, patented, along the Trinity River; old tunnels and shafts; bedrock 20 to 60 feet deep; some rich ground; under option to Wilsie & Hammond; being prospected by drilling for dredging.

Hidden Treasure, in Lower Trinity mining district, on west side of Trinity River. Owner, J. B. McDonald; comprises 60 acres, located in 1903; bedrock is slate; depth of gravel, 40 feet; running tunnel, present length being 65 feet; size 4 feet by 7 feet; not on bedrock; prospecting his ground; some good gravel.

Rainbow, in Sec. 33, T. 38 N., R. 8 W., in the Trinity Center mining district, 6 miles northwest of Carrville, in the Shasta Reserve. Owner, Rainbow Mining Company, of Carrville, A. Patton, president; slate bedrock; 20 to 50 feet of gravel; comprises 60 acres on Coffee

Creek; tunnel, 120 feet long, 6½ by 3½ feet and old shafts, 40 to 50 feet deep; some rich ground worked; small producer.

Bibl.: Report XIII, p. 460.

Sam Hampton, in Secs. 16 and 17, T. 35 N., R. 8 W., in the Minersville mining district, 4 miles north of Minersville, in the Trinity Reserve. Owner, C. E. Wright; comprises 80 acres, on east fork of Stewart's Fork; slate bedrock; depth of gravel, 30 to 50 feet; tunnel 80 feet long, 4 feet by 6 feet; water from east fork of Stewart's Fork through a ditch ¾ mile long; idle; worked during the winter; owner trying to find another pay channel.

Snow Gulch, in Sec. 20, T. 37 N., R. 7 W., in the Trinity Center mining district; 3 miles north of Trinity Center, in the Shasta Reserve. Owner, G. Abrams; comprises 35 acres on Snow Gulch; tunnel, 60 feet long, 4 feet by 6 feet, another 40 feet, and 4 feet by 6 feet; old shaft 40 feet deep; good producer.

Wilker, in Sec. 5, T. 39 N., R. 7 W., in the Trinity Center mining district, ¾ mile north of Trinity Center, in the Shasta Reserve. Owner, J. E. Crawford; comprises 160 acres on Hatchet Creek; schist bedrock; depth of gravel, 10 to 45 feet; tunnel 80 feet long, 3½ feet by 6½ feet; equipment: car, 500 feet of pipe, dwelling; water from Hatchet Creek through a ditch 1 mile long; some coarse gold; small producer.

GOLD DREDGING.

The known dredging fields in Trinity County are located along the Trinity River, near the towns of Trinity Center, Lewiston, and Junction City, and consists of several thousand acres. Two dredges are in operation at the present time, one at Trinity Center, and the other at Lewiston. The ground near Junction City has been drilled and the installing of a dredge is contemplated.

Bibl.: Bull. No. 36, pp. 102–104; No. 57, p. 11; U. S. G. S. Bull. No. 540, p. 19.

Alta Bert, in Secs. 8, 9, 4, 5, 32, 33 and 29, T. 36 and 37 N., R. 7 W., in the Trinity Center mining district, in town of Trinity Center, in the Shasta Reserve. Owner, Alta Bert Dredging Company, of San Francisco; H. Peake, president; W. W. Johnson, secretary; W. H. Christie, vice-president and manager; M. Ashley, superintendent. Comprises 2000 acres, patented, along the Trinity River. Slate and granodiorite; depth of gravel, 15 to 40 feet; loose and easily worked; gravel channel in places over ½ mile wide. Dredge is of the Oroville type with 5½-foot bucket, operated by electricity from Trinity Power Company; sawmill, capacity 15,000 feet per day; shops, office and several dwellings. Eighteen men employed. Company has acquired large number of old placer claims; also have an option on the Bloss & McClary hydraulic mine. Alta Bert is said to exceed the LaGrange hydraulic mine in production. Some very rich gravel. (See photo No. 6.)

Bibl.: Bull. No. 36, p. 104; U. S. G. S. Bull. No. 540, p. 19.

Photo No. 6. Dredge of Alta Bert Dredging Company.

Trinity Gold Dredge Company, formerly known as *Blakemore and Rocky Bar,* in the Lewiston mining district, in Secs. 32, 33 and 28, T. 34 N., R. 8 W., 4 miles north of Lewiston. Owners, Trinity Gold Dredge Company of Chico; H. E. Chesboro, president; manager, E. L. Smith; superintendent, H. Harris. Comprises 900 acres, patented, along the Trinity River. Slate bedrock; depth of gravel, 40 feet; loose and easily worked; dredge of Oroville type built by New York Engineering Company, with 11-foot bucket, and no stacker but run tailings on a 200-foot sluice-way floated on a barge, with iron rails for riffles, and no plates used; shops; 1500 h.p. electrical plant, with 5 miles of power line; dwellings; 15 men employed; pays dividends; been in operation since 1911.

Bibl.: Bull. No. 36, p. 104; U. S. G. S. Bull. No. 540, p. 20.

GRANITE.

The granite in Trinity County is principally a hornblende granite, and where not decomposed generally shows the effect of strong pressure. These fracture planes and the quartz seams cutting through the rock render much of it unfit for commercial use.

In the Rush Creek quarry, formerly worked by Masterson & Armstrong, of Redding, the hard boulders found in the soft mass of weathered granite were used for ornamental and monumental purposes. This deposit is in Sec. 26, T. 34 N., R. 9 W., M. D. M., on Rush Creek, 6 miles east of Weaverville, the county seat.

Bibl.: Report XII, p. 387; Bull. No. 38, p. 57.

IRON.

Iron ore deposits are reported in several localities in the county, but none of the merit have as yet been developed. In Secs. 4, 5, 9 and 10, T. 30 N., R. 10 W., M. D. M., on the northwest side of Chauchelulla Peak, stringers of iron ore are found lying in contact with large bodies of hypersthene, and the superficial resemblance of the latter material to iron ore may have caused the claim of large outcrops of iron ore in that vicinity.

Bibl.: Bull. No. 38, p. 305.

LIMESTONE.

Limestone is found in many places in this county, a belt of Devonian limestone, associated with igneous rocks, is found running parallel with the South Fork of the Trinity River from its source to Hoopa Valley; also a parallel belt of Devonian limestone running to the northeast of the preceding and another belt of Carboniferous limestone entering Trinity from the southeast in T. 29 N., R. 10 W., running northwest along Hay Fork River, disappearing north of Hay Fork and showing farther north on New River.

Bibl.: Bull. No. 38, p. 94; Diller-American Journal of Science, 4th Series, Vol. 15, p. 342.

On Brown's Mountain, in Sec. 21, T. 33 N., R. 9 W., M. D. M., a belt of limestone was quarried several years ago and burned in a limekiln, and the product used in the masonry of the courthouse at Weaverville. It is owned by the Southern Pacific Railroad Company.

Bibl.: Bull. No. 38, p. 94.

In the *Hay Fork Valley,* in Secs. 1, 3 and 33, T. 31 N., R. 11 W., M. D. M., a belt of limestone, exposed in places running northwest, is observed.

Bibl.: Bull. No. 38, p. 94.

A body of limestone, at the head of *Oregon Gulch,* in Sec. 3, T. 33 N., R. 10 W., M. D. M., was the source of lime in 1856, which was used in the construction of several buildings in Weaverville.

Bibl.: Bull. No. 38, p. 94.

MARBLE.

Outcrops of gray marble occur near the mouth of East Fork and near Taylor's Flat, in the Big Bar mining district; deposit has not been worked and its extent not determined.

Bibl.: Report XIII, p. 633.

MINERAL PAINT.

A body of red ocher has been used locally in Minersville, from the deposit owned by T. Bowerman, located in Sec. 15, T. 35 N., R. 8 W., M. D. M., on the east side of the east fork of Stewart's Fork. The ocher shows the blocky structure of the country rock, a highly weathered deposit of igneous origin.

Southern Pacific Railroad Company owns a deposit of similar material in Sec. 9, T. 35 N., R. 8 W., M. D. M.

Bibl.: Bull. No. 38, p. 342.

MINERAL WATER.

The Deer Lick Springs, formerly known as the Coombs, in Secs. 6 and 7, T. 30 N., R. 9 W., 9 miles southwest of Hay Fork, are the only springs in Trinity County to have the water on the market. Owners are the California Medicinal Springs Company, of New York; W. E. Joy, president. This company controls some 106 acres in all; there are 20 springs, one sulphur and the others iron. Water is bottled under the trade name of ''Nipicuro'' and is said to be good for all blood diseases. Only one spring has been developed, and the output at present is small. Reached by trail from Hay Fork. (Analysis follows.)

Bibl.: Report XIII, p. 523.

Another spring has been reported near Big Bar, in Sec. 3, T. 33 N., R. 12 W. It is owned by J. C. Pattison.

ANALYSIS OF "NIPICURO,"

A natural medicinal spring water from Deer Lick Springs, Trinity County, California.

	Parts per million	Grains per gallon
Total solids	8,560.00	496.48
Silica	24.82	1.44
Iron and aluminum (Fe and Al)	9.47	.55
Calcium (Ca)	1,521.53	88.25
Magnesium (Mg)	21.43	1.24
Sodium (Na)	1,332.05	77.26
Potassium (K)	163.17	9.14
Iodine (I)	5.19	.30
Sulphuric acid radical (SO_4)	1,504.17	87.24
Carbonic acid radical (CO_3)	53.62	3.11
Bi-carbonic acid radical (HCO_3)	436.03	25.29
Metaboric acid radical (BO_2)	Heavy trace	----------
Chlorine (Cl)	3,433.46	200.94
Oxygen to form Fe_2O_3	4.05	.23
	8,539.99	991.47
Hypothetical form of combination--		
Sodium chloride (NaCl)	3,388.04	196.51
Potassium iodide (KI)	6.79	.39
Potassium chloride (KCl)	308.26	17.88
Magnesium sulphate ($MgSO_4$)	104.33	6.05
Sodium metaborate ($NaBO_2$)	----------	----------
Calcium chloride ($CaCl_2$)	1,972.64	114 41
Calcium sulphate ($CaSO_4$)	1,543.67	89.53
Calcium carbonate ($CaCO_3$)	89.36	5.18
Calcium bi-carbonate ($Ca(HCO_3)_2$)	756.94	43.90
Iron oxide and alumina (Fe_2O_3 and Al_2O_3)	13.52	.78
Silica (SiO_2)	24.82	1.44
Hydrogen sulphide gas	117.82	6.83

Reaction, strongly alkaline.

Analysis made by Professor Sanford C. Dinsmore, United States Government Agricultural Department, Nevada State University, Reno, Nevada.

ORNAMENTAL STONES.

A prominent belt of *jasper* occurs on the divide between the north fork of Trinity River and the east fork of the north fork, showing especially in Secs. 5 and 8, T. 35 N., R. 11 W., M. D. M.

Another belt is found on Red Mountain, at the head of Prospect Creek, in the southwest corner of T. 29 N., and in northwest corner of T. 28 N., R. 11 W., M. D. M.

Garnet is found in the vicinity of Carrville. Discovered in 1899 by G. L. Carr; richly colored ouvaroite (lime-chrome garnet) in small dodecahedral crystals from 1 to 3 millimeters in diameter, deep green in color, coating seams or cavities in chrome iron.

Bibl.: Bull. No. 37, pp. 39, 53.

PLATINUM.

Platinum is found in a number of placer mines in this county, but more especially in a belt from 10 to 15 miles wide from Junction City westward down the Trinity River; also a belt running in a southerly direction and covering the east side of Hay Fork. All the mines in the South Fork section carry some platinum associated with gold. One clean-up near Junction City gave returns of 7 ounces of platinum to 240 ounces of gold, and occurs in well rounded grains. In the vicinity of Hay Fork it occurs as shot. Trinity at one time led in the production of platinum, but Butte County now ranks first on account of the recovery in the dredging operations.

Bibl.: Report X, p. 717; Bull. No. 38, pp. 346–49, 369; Bull. No. 36, p. 104.

QUICKSILVER.

Surface indications of quicksilver ores are found in several places throughout Trinity County, but active mining for this metal has only been pursued in the northeastern part of the county, between Crow Creek, a tributary to the east fork of the Trinity River, and the north fork of the east fork of the Trinity River. On the surface the country rock is serpentine, at times very much altered, probably being a product of igneous rocks. The material wherein the ore bodies form is a feldspar porphyry.

Bibl.: Reports VIII, p. 643; X, pp. 716–17; XII, pp. 371–72; Bull. No. 27, pp. 192, 193, 195; U. S. G. S., Monograph XIII, p. 366, 1888.

Altoona Quicksilver Mine, in Sec. 22, T. 38 N., R. 6 W., M. D. M., comprises the Trinity, Altoona and part of the Blockade mining claims, in the Shasta Forest Reserve, about 15 miles northeast of Carrville. It is owned by the Altoona Quicksilver Mining Company, of San Francisco. The holdings consist of several hundred acres of patented land; elevation, 4700 feet; acquired by this company in 1875, but prior to this time considerable quicksilver was extracted from surface workings. It was closed down from 1879 to 1894, on account of law-suits. Some work done since 1894. There are four veins, three coming together at the lowest level, forming a mineralized zone 400 feet long, and from 4 to 50 feet wide; walls are quartz-porphyry; workings consist of a vertical shaft 450 feet deep, with 5 levels. In the lowest level, another shaft, 152 feet deep was sunk, from which 2 levels were driven. There are 7 levels in all, covering a territory of 1600 feet in a northwest and 1120 feet in a northeast direction, within which 4 different veins were worked to a depth of 600 feet. Mine makes considerable water, and was shut down in 1902, when fire destroyed part of the reduction plant, which has since been repaired. The reduction plant consists of a Knox & Osborne ore furnace. Several buildings on the property. It is the only quicksilver producer in the county, but only a few hundred dollars worth of this metal has been the yearly output in recent years. Up to 1903 this mine produced 29,181 flasks. The old dump is now being worked. Water in the lower levels

Bibl.: Reports VIII, p. 643; X, p. 716; XII, p. 371; Bull. No. 27, p. 192; U. S. G. S., Monograph XIII, p. 366, 1888.

Carr, consisting of one claim, in Sec. 22, T. 38 N., R. 6 W., M. D. M., is only slightly developed by open cuts, exposing a little ore. It is owned by G. Carr, of Carrville.

Bibl.: Bull. No. 27, p. 193.

Integral, a small quicksilver producer a few years ago, is located in Secs. 14, 15, 21, 22, 23, 27 and 28, T. 38 N., R. 6 W., M. D. M., near Altoona, and in the Shasta Forest Reserve. It is owned by the Integral Mining Company, of San Francisco; E. W. McGraw, president. The holdings consist of 46 claims, and several sections of timber land. Ore occurs in lenses, but no large bodies exposed in the workings, which consist of a shaft 180 feet deep, 5 levels, a winze 120 feet deep, connecting the lower level with a tunnel 2760 feet long; also a few hundred feet of drifts; considerable amount of surface work has been done. Reduction equipment consists of a 24-ton Knox & Osborne furnace. Several buildings on the property. Only do assessment work.

Bibl.: Report, XII, p. 373; Bull. No. 27, pp. 193–194–195.

Trinity, consists of three claims, undeveloped, in Secs. 21 and 22, T. 36 N., R. 6 W., near the Carr prospect. Owned by Rieschling Brothers. Idle.

Bibl.: Bull. No. 27, p. 195.

SOAPSTONE.

Soapstone is found on Brown's Mountain, in Sec. 21, T. 33 N., R. 9 W., M. D. M., the croppings having a light gray color. It does not weather nor harden when exposed to the air. When put in the fire it does not disintegrate, and is used as fireproof material in fireplaces.

Bibl.: Bull. No. 38, pp. 353, 371.

BIBLIOGRAPHY.

Publications by State Mining Bureau.

	Page
Report II	35, 36, 47, 184, 190.
Report IV	33, 158, 170, 310, 358.
Report V	69.
Report VI (Part 1)	102, 104, 106, 120, 127. Part 2, Page 188.
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Report VIII	637, 643.
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Report XII	62, 63, 307, 314, 371, 372, 387.
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Bulletin No. 52	53.
Bulletin No. 57	11.
Bulletin No. 67	13, 21, 23, 24, 36, 42, 50, 74, 76, 80, 81, 123, 127, 152, 180.

Register of mines and map of Trinity County.

Publications by U. S. Geological Survey.

Monograph XIII, page 366, 1888.
Mineral Resources of United States.

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1902	239, 253.
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1904	165, 166, 169–173, 177.
1905	115, 164, 165–169, 172, 182–184.
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Topographical sheet, Shasta Quadrangle.

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Bulletin No. 193	51–54.
Bulletin No. 196	9–24, 41–44, 52, 64, 1902.
Bulletin No. 430	48–58. 1910.
Bulletin No. 470	18–20, 21, 22, 25, 29, 1911.
Bulletin No. 530	9–41, 1913.
Bulletin No. 540-A, 1913	

Other Publications.

Geological History of Klamath Mountain Region.
Diller, J. S., Am. Jour. Sci., 4th Series, Vol. 15, p. 343.
Hersey, O. H., Am. Geologist, Vol. 27, p. 245, 1901.
Hersey, O. H., Am. Jour. Sci., 4th Series, Vol. 30, p. 273, 1912.
Hersey, O. H., Gold Bearing Lodes in California. Am. Geologist, Vol. 25, pp. 76–96, 1900.
Hersey, O. H., Origin and Age of Certain Gold Deposits in Northern California. Am. Geologist, Vol. 24, pp. 38–43, 1899.

APPENDIX.

PUBLICATIONS OF THE CALIFORNIA STATE MINING BUREAU.

Publications of this Bureau will be sent on receipt of the requisite amount. Only stamps, coin or money orders will be accepted in payment.

Money orders should be made payable to the STATE MINING BUREAU.

Personal checks will not be accepted.

REPORTS.

Asterisk (*) indicates the publication is out of print.

			Price.
*Report	I.	Henry G. Hanks. 1880.	
*Report	II.	Henry G. Hanks. 1882.	
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Samples (limited to three at one time) of any mineral found in the state may be sent to the Bureau for identification, and the same will be classified free of charge. No samples will be determined if received from points outside the state. It must be understood that no assays, or quantitative determinations will be made. Samples should be in lump form if possible, and marked plainly with name of sender on outside of package, etc. No samples will be received unless delivery charges are prepaid. A letter should accompany sample, giving locality where mineral was found and the nature of the information desired.

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BULLETIN No. 73

FIRST ANNUAL REPORT

OF THE

State Oil and Gas Supervisor of California

FOR THE FISCAL YEAR 1915-16

Covering Operations of the Department of Petroleum and Gas of the State Mining Bureau

---

Submitted to
FLETCHER HAMILTON, State Mineralogist

by

R. P. McLAUGHLIN, State Oil and Gas Supervisor

DEPUTY SUPERVISORS
M. J. KIRWAN
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CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO
1917

27014

LETTER OF TRANSMITTAL.

November, 1916.

To His Excellency, the HONORABLE HIRAM W. JOHNSON, *Governor of the State of California,*

SIR: I have the honor to herewith transmit Bulletin No. 73 of the State Mining Bureau, being the first annual report of the State Oil and Gas Supervisor, relative to the work of protecting the oil fields from damage by infiltrating water.

The report is worthy of special comment because the law authorizing the work is an entirely original development from California experience and not previously used in any other state.

The legislation being a pioneer work, it is particularly gratifying to find, after a year's experience, that it is not only effective but meets with the approval of most of the oil operators and that only minor details need revision.

It is of special importance to note that the details of administering the law have been entirely in the hands of practical oil men who have had, in addition to the experience gained in the oil fields, technical training at various universities. The marked success of numerous other industries has been due to the application of the same principle and the present demonstration of its value to the oil business is of great importance.

The subject of action by the federal government, relative to the oil lands of California, is of extreme importance to our oil operators. The question has not been dealt with by the State Mining Bureau, but attention should be called to the fact that, regardless of other phases of the question, protection of the lands from damage by infiltrating water and similar waste can best be attained by the sole use of the present state law.

Respectfully submitted.

FLETCHER HAMILTON,
State Mineralogist.

TO FLETCHER HAMILTON,
State Mineralogist.

SIR: I have the honor to herewith hand you the first annual report covering the operations of the Department of Petroleum and Gas of the State Mining Bureau, as required by law. It gives me special pleasure to here mention the ideal conditions governing my work under your general supervision.

Respectfully submitted.

R. P. MCLAUGHLIN,
State Oil and Gas Supervisor.

October 1, 1916.

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CHAPTER I.

GENERAL STATEMENT AND REVIEW OF DEPARTMENTAL WORK.

By R. P. McLAUGHLIN, State Supervisor.

The law establishing the Department of Petroleum and Gas of the State Mining Bureau (Chapter 718, Statutes of 1915), became effective August 9, 1915. It provides that the department shall be under the general jurisdiction of the State Mineralogist, whose office was created by law April 16, 1880, and that he shall appoint as supervisor an engineer or geologist, experienced in the development and production of petroleum. It is the duty of the supervisor to so supervise the drilling, operation, maintenance and abandonment of petroleum or gas wells, as to prevent damages to the petroleum and gas deposits of the state from infiltrating water and other causes.

The supervisor must make a report to the State Mineralogist, on or before October 1st, giving the financial details of the operation of the department for the preceding fiscal year, and such other information as he may deem advisable. In making this first report it is pleasant to state that conditions contributing to successful work have been almost ideal. In the first place the widest possible latitude has been afforded me by the State Mineralogist, Mr. Fletcher Hamilton, and it is of especial public interest to be able to state that political interference has been entirely absent. The second factor is the hearty cooperation by a large majority of the oil operators throughout the state. Last but by no means of least importance, are the loyal and intelligent efforts of other officers of the department: Messrs. M. J. Kirwan, Chester Naramore, Robert B. Moran and Roy E. Collom, who have served as deputies in the various oil fields, and Mr. I. M. Johnson, who has attended to the clerical work of the San Francisco office, which was of great proportions, due to the commencing of an entirely new department.

A brief outline of the law and the method of its enforcement may help in understanding the main body of the report. The law was the culmination of many efforts on the part of oil operators throughout the state, to devise some plan whereby the damage of their properties by infiltrating water might be avoided and cured. The general public is also vitally interested in preventing waste of the natural supply of petroleum, which serves every branch of industry in California and neighboring states, as well as other countries, touched by the Pacific Ocean. A rough estimate of the value of some of the oil properties may not be amiss. There are 80,702 acres of proved oil land, with a market value of at least $1000 per acre, or a total of $80,702,000. There are approximately 2000 miles of pipe lines costing on an average of

$20,000 per mile, or a total of $40,000,000. There are nearly 30 refineries, with a total daily refining capacity of about 175,000 barrels of crude oil and representing a total investment of probably $15,000,000. There are approximately 40 tank steamers serving the California oil fields, having a total carrying capacity of about 1,500,000 barrels and costing not less than $15,000,000. The producing oil wells number over 7000 and have cost over $100,000,000. Therefore the total investment in the oil business, without considering such railroads, towns, electric lines, water systems and other improvements constructed solely on account of it, represent an expenditure of at least $250,000,000. There is a constant annual addition to these expenditures due to the drilling of new wells, which during the past fiscal year amounted to about $6,000,000 for 400 wells. Annual expense also involves deepening, redrilling and abandoning wells, which during the past year probably cost nearly $1,000,000.

This total investment is directly dependent upon the stability of the oil fields and the steps taken to safeguard them, such as the work in the hands of this department. The annual expenditure for new wells and other work is particularly affected by the advisory work of the bureau, and the members of the staff keenly appreciate the responsibility resting upon them.

The annual cost of conducting the work of this department, which should be considered in much the same manner as insurance, is $45,000 or less than two one-hundredths of one per cent of the capital invested.

Our policy of administration during the first year has been uniformly lenient. There may be some individuals who would criticise such a policy, but it must be remembered that ultimate success of the protective work depends upon a thorough and sympathetic understanding of its details by the owners of wells and their employees, who must be depended upon to ultimately carry out most of our suggestions. Such cooperation could not have been obtained by merely applying the penalties provided by law, without first explaining the constructive methods provided by it. The leniency of the past year will not, however, be indefinitely continued.

The damage done to oil fields by water arises from the fact that when water is admitted to a sand stratum, saturated with oil, it tends to displace the oil. If the entrance of water is at or near an oil well, it frequently drives the oil away from the well, which then produces only water. This process also continues along the strata and affects neighboring wells in a like manner. The entrance of the water into an oil-bearing sand is due to two primary causes: first, incomplete knowledge of geological conditions surrounding a well, and second, faulty mechanical conditions in drilling or maintaining the well. There are a great many combinations of these two causes and a general idea of them can most easily be gained by consideration of the following sketches, which are merely a few typical cases and scarcely touch upon the various complications due to geological and mechanical conditions.

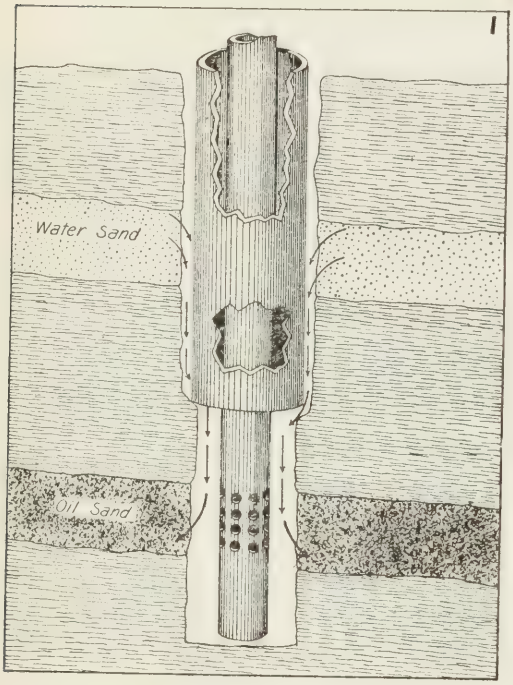


Fig. 1. Sketch showing entrance of water into oil sand due to imperfect seating of casing and to lack of cement around bottom of outer casing.

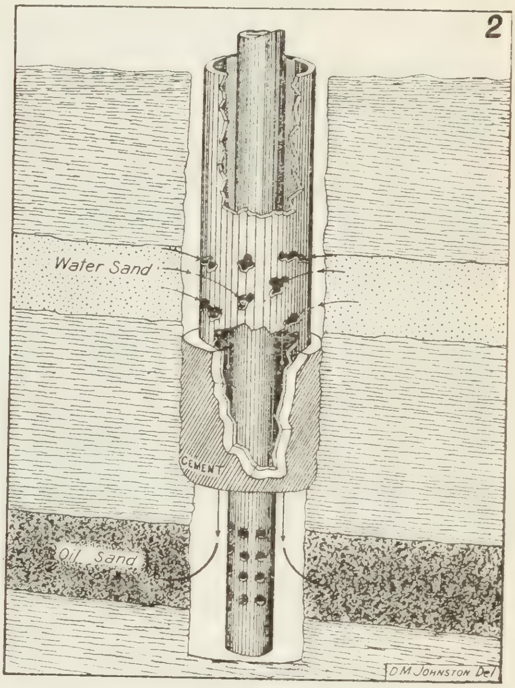


Fig. 2. Sketch showing entrance of water due to holes eaten in casing by chemical action.

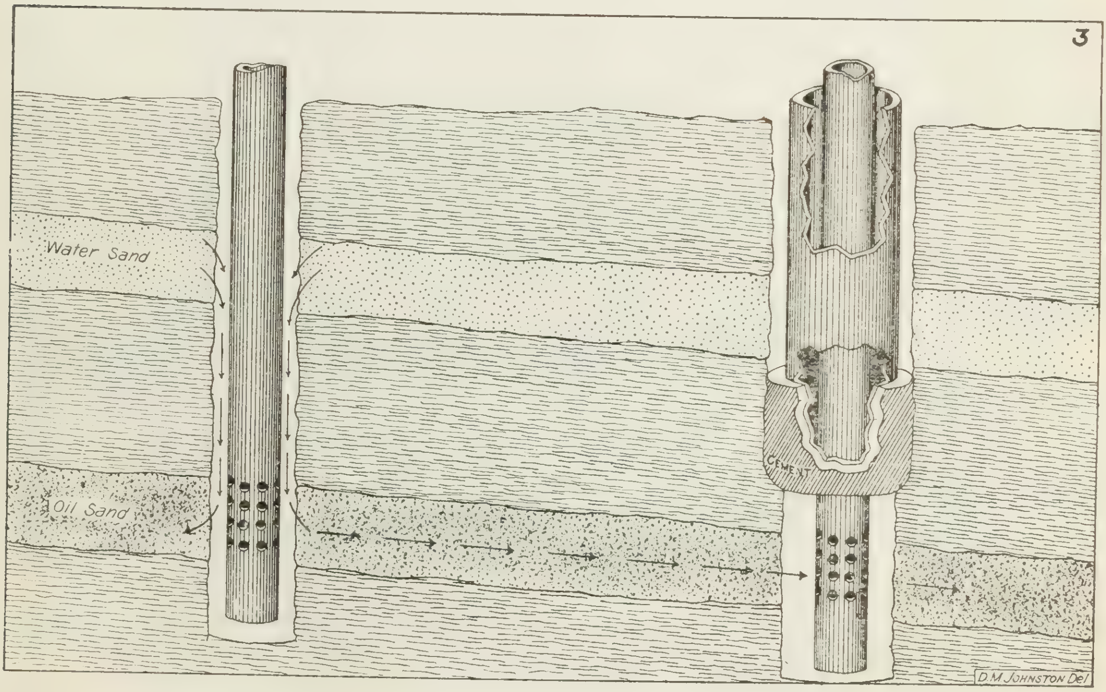


Fig. 3. Sketch showing entrance of water into oil sand and its migration to a properly drilled well. Due to use of only one string of casing in first well.

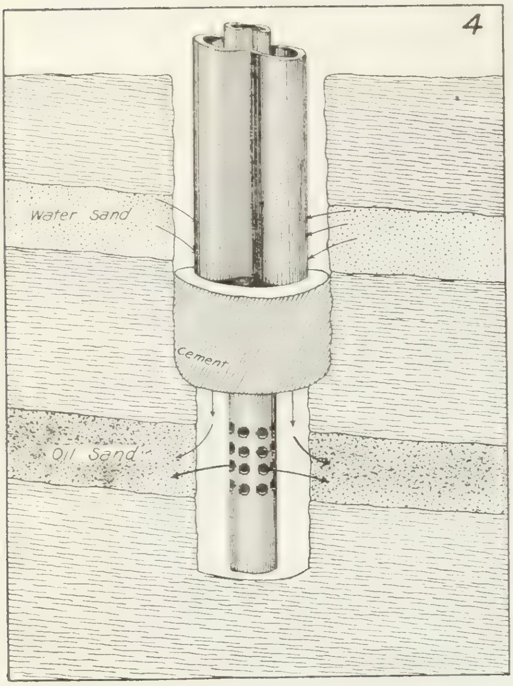


Fig. 4. Sketch showing entrance of water into oil sand due to collapse of casing.

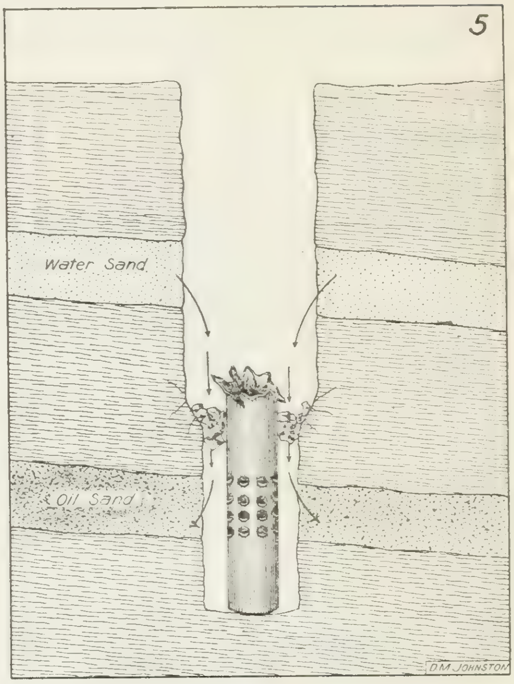


Fig. 5. Sketch showing entrance of water into oil sand due to withdrawal of casing from an abandoned well without placing a plug between oil and water sands.

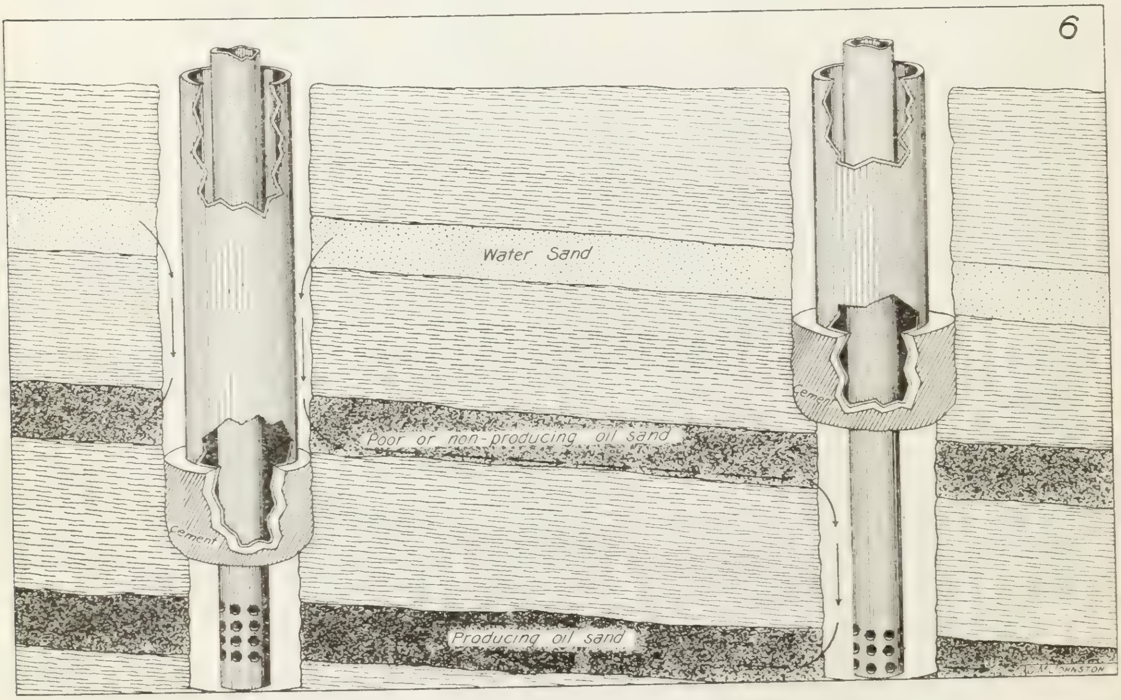


Fig. 6. Sketch showing entrance of water due to lack of uniformity of distance of shut-off below water sands when two wells penetrate the same strata. If there were only one well, either one would probably be in good condition.

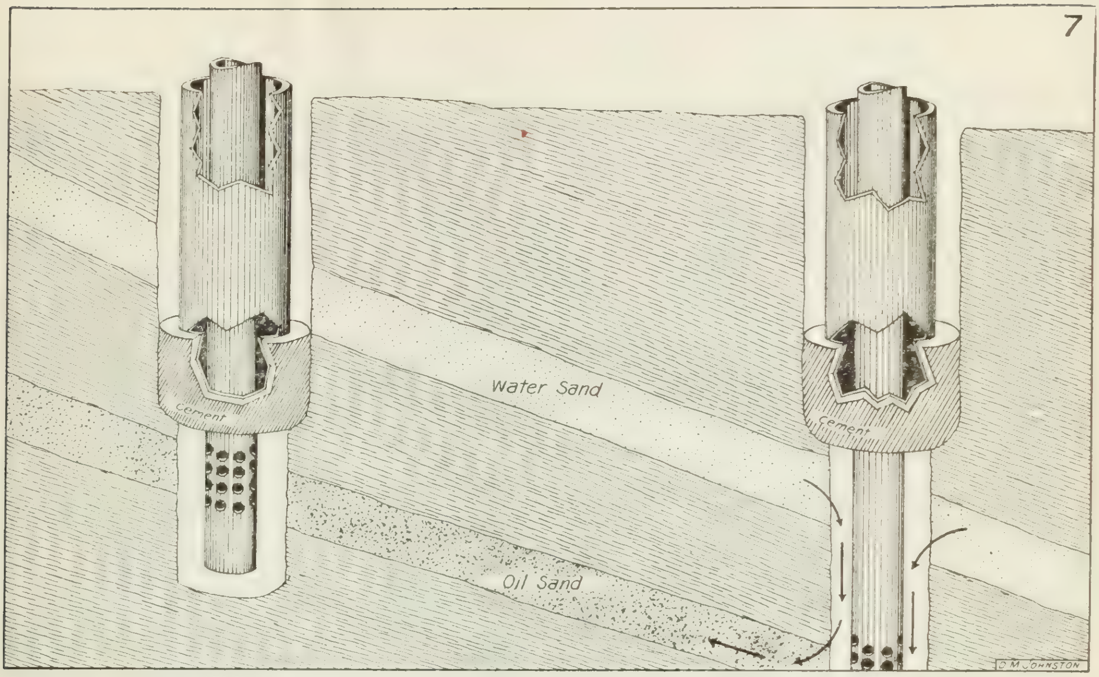


Fig. 7. Sketch showing entrance of water due to fact that shut-off was made at the same depth in two wells without considering the geological fact that strata most frequently do not lie parallel to the ground surface.

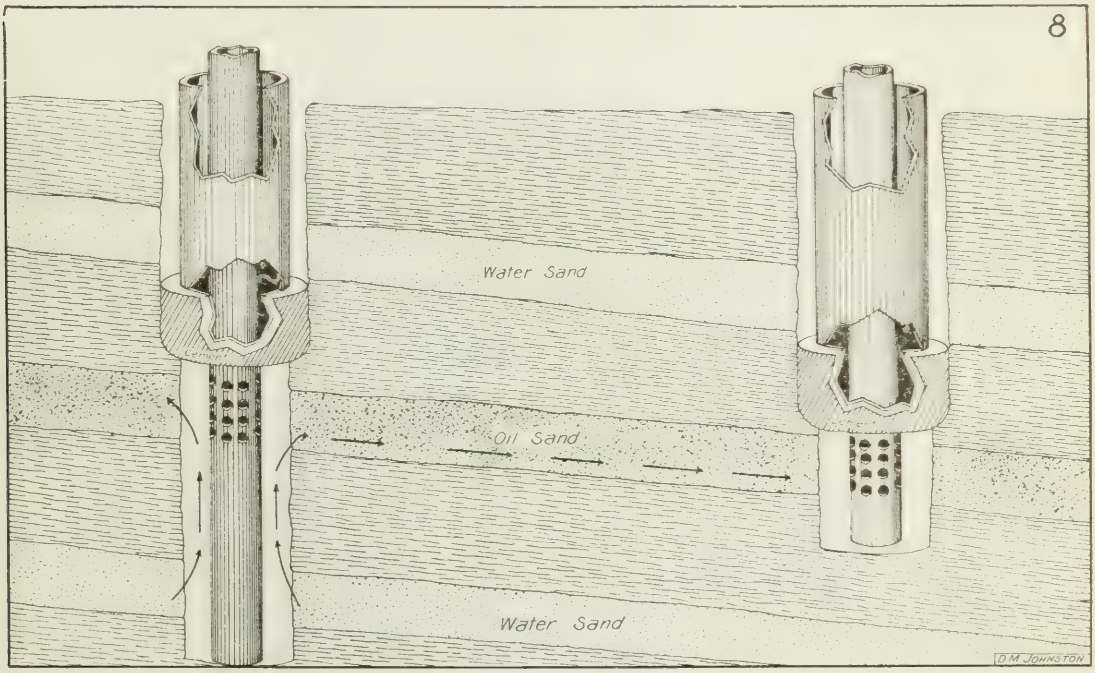


Fig. 8. Sketch showing entrance of water into a properly drilled well due to the fact that another well drilled into a water bearing sand below the oil sand but did not plug the lower portion of the well.

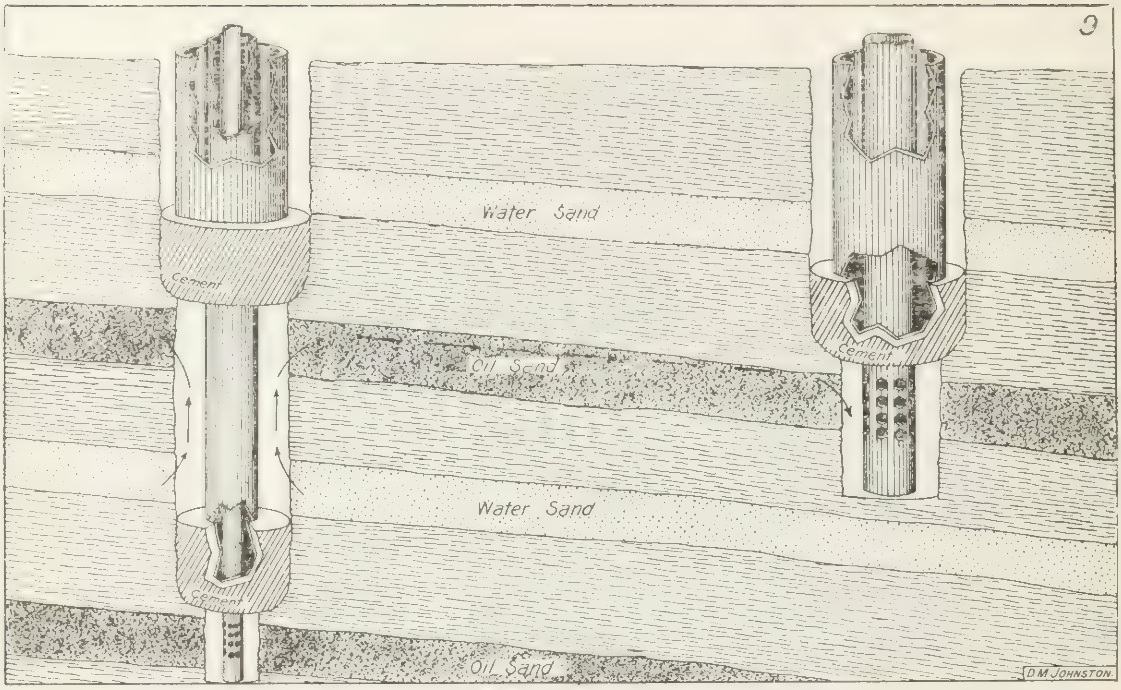


Fig. 9. Sketch showing entrance of water into aproperly drilled well because a neighboring well entered a deeper oil sand without inserting an extra string of casing to protect the first sand.

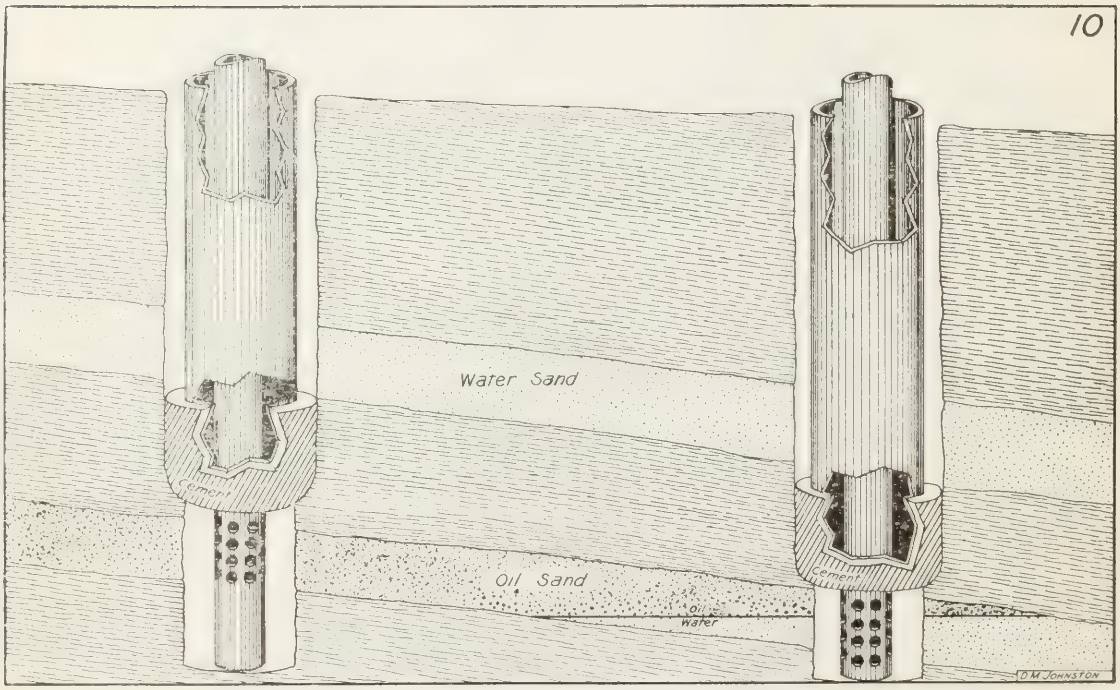


Fig. 10. Sketch showing presence of edge water due to a natural condition. Most oil sands when followed far enough down the dip are found to contain only water. As oil is removed from above water follows it up along the stratum.

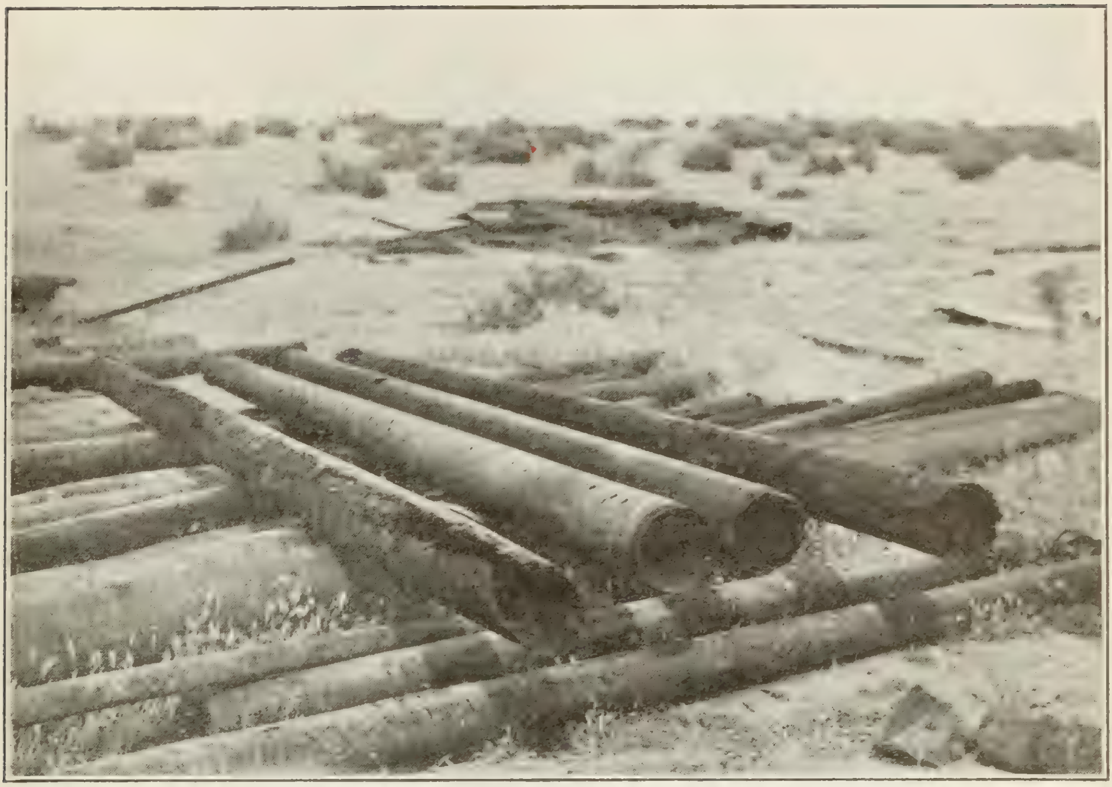


Fig. 11. View of six inch casing, corroded between depths of 1700 ft. and 1900 ft. after about four years use. (Photo by Paul M. Paine.)

There are various terms used in dealing with the handling of water in oil wells, and for convenience they can be best defined here in conjunction with the foregoing sketches.

Formation shut off. The landing of casing in the walls of the well in such a manner as to prevent the passage of water without use of cement, as illustrated in Fig. No. 1.

Water string. The casing placed in the well primarily for the purpose of preventing water from migrating from its original position to other strata, as illustrated by the casing of larger diameter in Fig. No. 2.

Top water. The water found in strata lying above the productive oil formation penetrated by a certain well, as illustrated in Figs. Nos. 1 to 7 inclusive.

Bottom water. The water found in strata lying below the productive oil formation penetrated by a certain well, as illustrated in Fig. No. 8.

Intermediate water. The water found in strata between productive oil formations penetrated by a certain well, as illustrated in Fig. No. 9.

Edge water. The water found in a sand which also contains oil at a higher elevation or, in other words, farther up the dip. Illustrated in Fig. No. 10.

The administration of the law is based upon the underlying fact that damage from water, as shown in the preceding sketches, is caused by many complications and combinations of physical conditions and therefore only can be prevented or remedied by first determining, as far as possible, what those conditions are at any particular locality. No definite rule or set of rules could be framed to cover all cases. Like all other engineering problems, this is a subject demanding a tedious collection and comparison of all pertinent facts and therefore the deputies appointed by the supervisor are, as is required by law, engineers experienced in the drilling and operating of oil wells.

The law provides various means for compelling observance of rulings made by the supervisor, but the cooperation of oil operators has made recourse to these practically unnecessary and they therefore require but little mention here, and it is my assumption that such a condition will prevail in the future. The department aims to serve the property owners and the public as an advisor rather than a prosecutor.

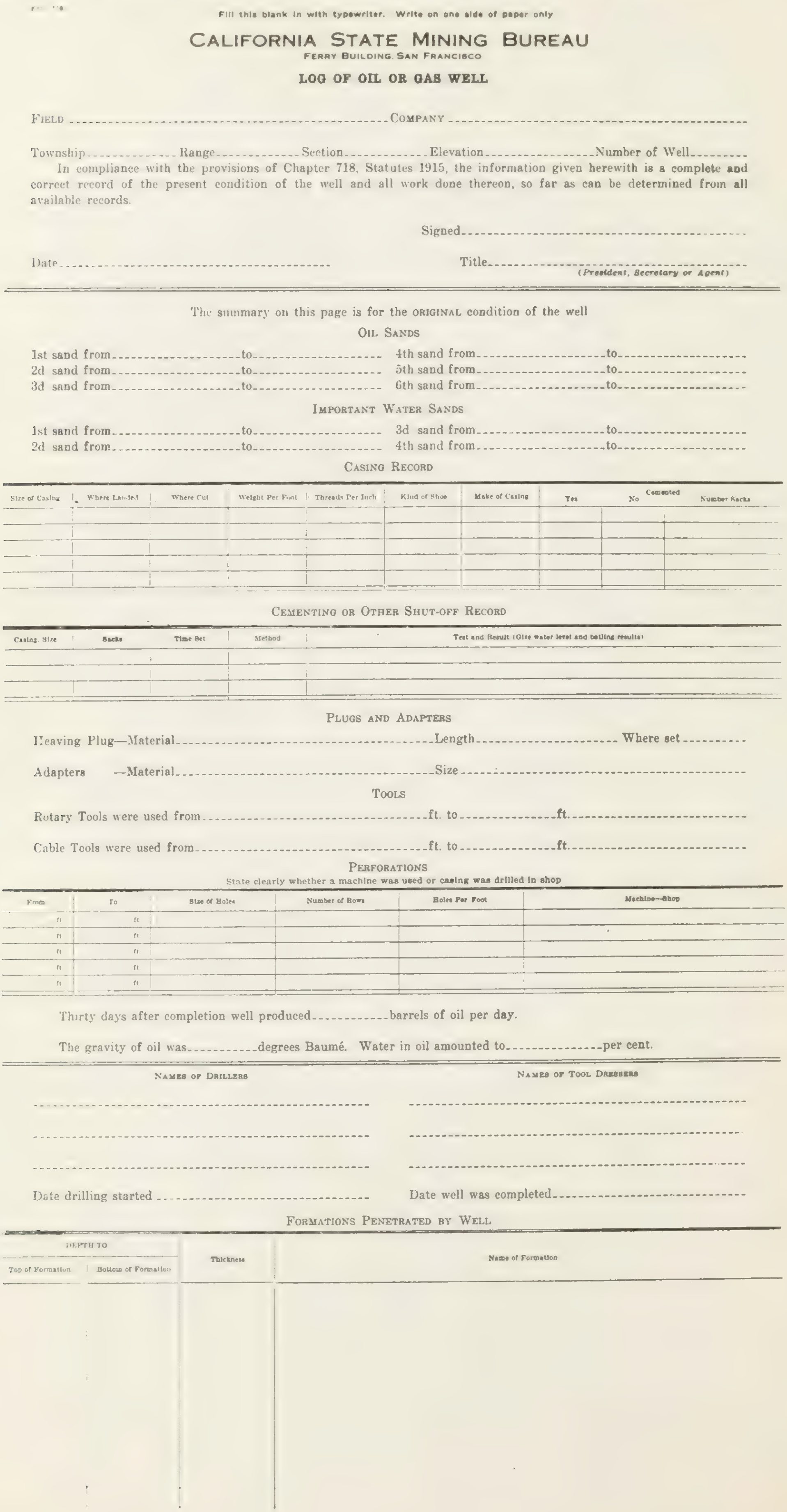
The information required to be furnished by operators and necessary to solve existing problems is of two classes. The first is a complete record or log of each well, giving in detail each and every step taken in its construction and repair, as well as the location and thickness of all strata penetrated so far as can be determined. The second class of information consists of a record continually brought down to date and showing the amounts of oil and of water produced by each well.

Proper method of keeping oil well logs. Several millions of dollars are spent each year in drilling oil wells in California. In most lines of business an accurate inventory would show exactly what had been obtained in return for the outlay. Many oil operators, however, spend their development funds and have little or nothing in the way of records to show them whether or not the work has been done properly or economically. To remedy such a condition the State Mining Bureau calls attention to proper methods of recording drilling operations, and furnishes complete printed forms for the final summarizing of the logs. It is to the interest of all operators to see that their records are so kept that all the information called for on the bureau's blanks can be supplied.

The first step in keeping proper logs is to see that the operations of the drilling crew are completely written down each and every tour or shift. There are several blank forms in common use which provide a convenient means of making these daily records. The State Mining Bureau does not furnish these forms but many printers are able to promptly supply the want. One of the handiest methods of keeping these daily drilling reports is to have them bound in book form, one page for each tour. A carbon copy of each page should be made, promptly removed from the book and filed in a safe place, because the original book is subject to loss or easily becomes soiled and illegible. The daily drilling reports show the depth of the well at the beginning and also at the end of the tour, what sort of work the crew was engaged in, the size, weight and amount of casing put in or taken out. It also records the depths at which there were changes in formation, describes or names the formations, and states what evidence there was to indicate the presence of oil, gas or water in the well. Some operators make the carbon copy of the daily report serve as a time card in computing the pay of the crew.

The work of the State Mining Bureau in protecting the oil fields against infiltrating water depends upon full and complete logs of wells and the law requires that they be furnished to the bureau. Where poor records have been encountered it is usually found that the operator had not kept daily reports.

The blank forms used in recording well logs are as follows:



Fill this blank in with typewriter. Write on one side of paper only

CALIFORNIA STATE MINING BUREAU

FERRY BUILDING, SAN FRANCISCO

LOG OF OIL OR GAS WELL

FIELD ------------------------------ COMPANY ------------------------------

Township ---------- Range ---------- Section ---------- Elevation ---------- Number of Well --------

In compliance with the provisions of Chapter 718, Statutes 1915, the information given herewith is a complete and correct record of the present condition of the well and all work done thereon, so far as can be determined from all available records.

Signed ------------------------------

Date ------------------------------ Title ------------------------------

(President, Secretary or Agent)

The summary on this page is for the ORIGINAL condition of the well

OIL SANDS

1st sand from -------------- to -------------- 4th sand from -------------- to --------------
2d sand from -------------- to -------------- 5th sand from -------------- to --------------
3d sand from -------------- to -------------- 6th sand from -------------- to --------------

IMPORTANT WATER SANDS

1st sand from -------------- to -------------- 3d sand from -------------- to --------------
2d sand from -------------- to -------------- 4th sand from -------------- to --------------

CASING RECORD

Size of Casing	Where Landed	Where Cut	Weight Per Foot	Threads Per Inch	Kind of Shoe	Make of Casing	Cemented		
							Yes	No	Number Sacks

CEMENTING OR OTHER SHUT-OFF RECORD

Casing Size	Sacks	Time Set	Method	Test and Result (Give water level and bailing results)

PLUGS AND ADAPTERS

Heaving Plug—Material ------------------------------ Length -------------- Where set --------

Adapters —Material ------------------------------ Size ------------------------------

TOOLS

Rotary Tools were used from ------------------------------ ft. to -------------- ft. --------------

Cable Tools were used from ------------------------------ ft. to -------------- ft. --------------

PERFORATIONS

State clearly whether a machine was used or casing was drilled in shop

From	To	Size of Holes	Number of Rows	Holes Per Foot	Machine—Shop
ft	ft				
ft	ft				
ft	ft				
ft	ft				
ft	ft				

Thirty days after completion well produced ---------- barrels of oil per day.

The gravity of oil was ---------- degrees Baumé. Water in oil amounted to -------------- per cent.

NAMES OF DRILLERS	NAMES OF TOOL DRESSERS

Date drilling started ------------------------------ Date well was completed ------------------------------

FORMATIONS PENETRATED BY WELL

Depth to		Thickness	Name of Formation
Top of Formation	Bottom of Formation		

Form 101. 20821—12-21-15—10M

CALIFORNIA STATE MINING BUREAU

LOG OF OIL OR GAS WELL—Continued

FIELD ____________________ COMPANY ____________________

Township ____________ *Range* ____________ *Section* ____________ *Number of well* ________

FORMATIONS PENETRATED BY WELL

DEPTH TO		Thickness	Name of Formation
Top of Formation	Bottom of Formation		

Form 102 8 10-15 10,000 18678

CALIFORNIA STATE MINING BUREAU

LOG OF OIL OR GAS WELL

FIELD ____________________ COMPANY ____________________

Township ____________ *Range* ____________ *Section* ____________ *Number of well* ________

In compliance with the provisions of Chapter 718, Statutes 1915, the information given herewith is a complete and correct record of all **work done on the well since the previous record**, dated ____________________, was filed.

Signed ____________________
(President, Secretary or Agent)

Date ____________________ Title ____________________

Form 103. 20822—12-21-15—10M

CALIFORNIA STATE MINING BUREAU

HISTORY OF OIL OR GAS WELL

FIELD ____________________ COMPANY ____________________

Township ____________ *Range* ____________ *Section* ____________ *Number of well* ________

Signed ____________________
(President, Secretary or Agent)

Date ____________________ Title ____________________

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of redrilling, together with the reasons for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "side tracked" or left in the well give its size and location. If the well has been dynamited give date, size, position, and number of shots. If plugs or bridges were put in to test for water state kind of material used, position, and results of pumping or bailing.

The best method of using the written logs of wells is by making from them a drawing showing all the information. Fig. No. 12 shows the conventional symbols and details adopted by this bureau.

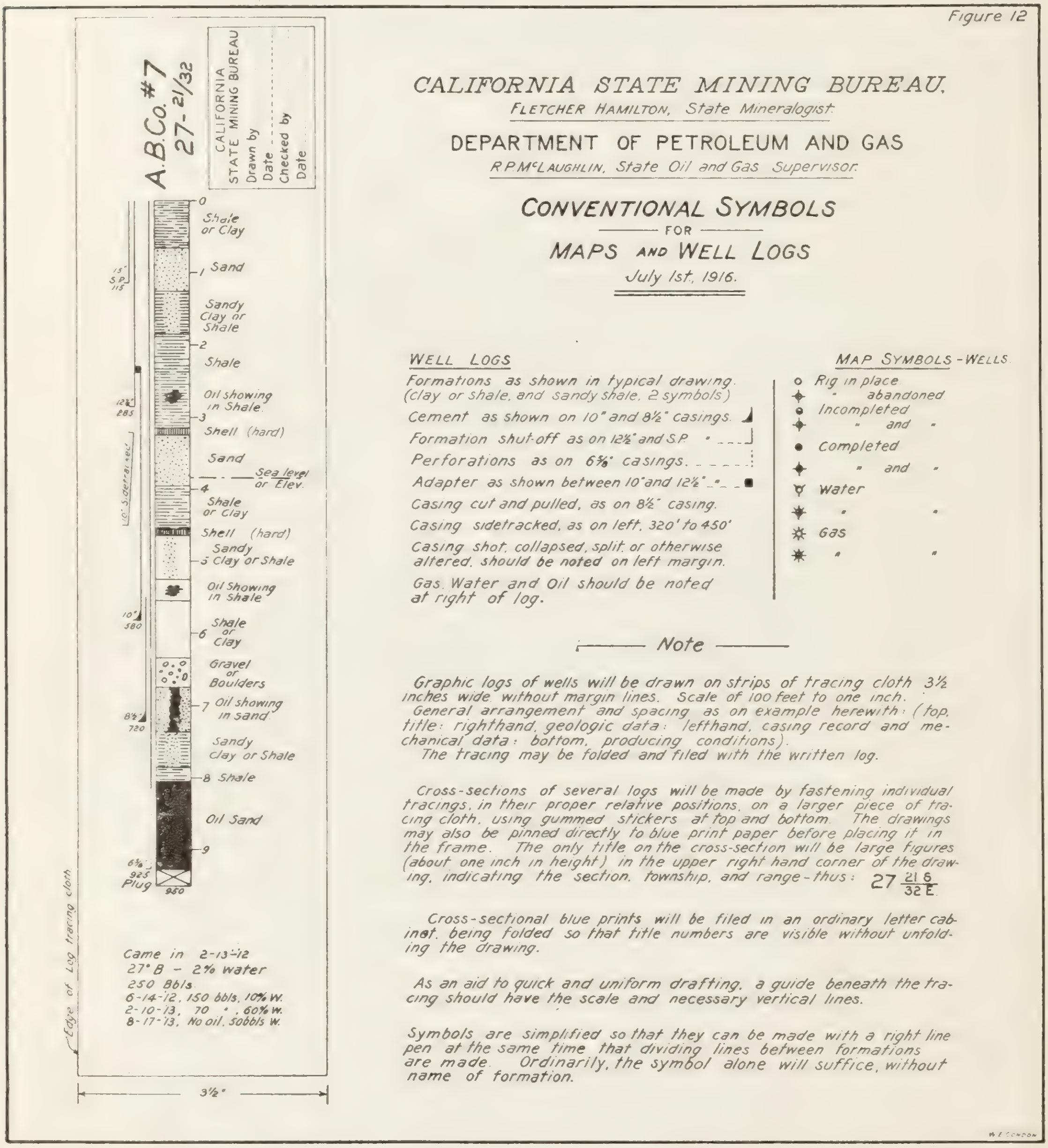


Figure 12

CALIFORNIA STATE MINING BUREAU.
FLETCHER HAMILTON, State Mineralogist.

DEPARTMENT OF PETROLEUM AND GAS
R.P. McLAUGHLIN, State Oil and Gas Supervisor.

CONVENTIONAL SYMBOLS
FOR
MAPS AND WELL LOGS
July 1st, 1916.

WELL LOGS

Formations as shown in typical drawing. (clay or shale, and sandy shale, 2 symbols)

Cement as shown on 10" and 8½" casings.

Formation shut-off as on 12½" and S.P.

Perforations as on 6⅝" casings.

Adapter as shown between 10" and 12½"

Casing cut and pulled, as on 8½" casing.

Casing sidetracked, as on left, 320' to 450'

Casing shot, collapsed, split or otherwise altered, should be noted on left margin.

Gas, Water and Oil should be noted at right of log.

Came in 2-13-12
27° B - 2% water
250 Bbls.
6-14-12, 150 bbls, 10% W.
2-10-13, 70 " , 60% W.
8-17-13, No oil, 50bbls W.

Note

Graphic logs of wells will be drawn on strips of tracing cloth 3½ inches wide without margin lines. Scale of 100 feet to one inch.

General arrangement and spacing as on example herewith: (top, title: righthand, geologic data: lefthand, casing record and mechanical data: bottom, producing conditions).

The tracing may be folded and filed with the written log.

Cross-sections of several logs will be made by fastening individual tracings, in their proper relative positions, on a larger piece of tracing cloth, using gummed stickers at top and bottom. The drawings may also be pinned directly to blue print paper before placing it in the frame. The only title on the cross-section will be large figures (about one inch in height) in the upper right hand corner of the drawing, indicating the section, township, and range—thus: $27\frac{21\,S}{32\,E}$

Cross-sectional blue prints will be filed in an ordinary letter cabinet, being folded so that title numbers are visible without unfolding the drawing.

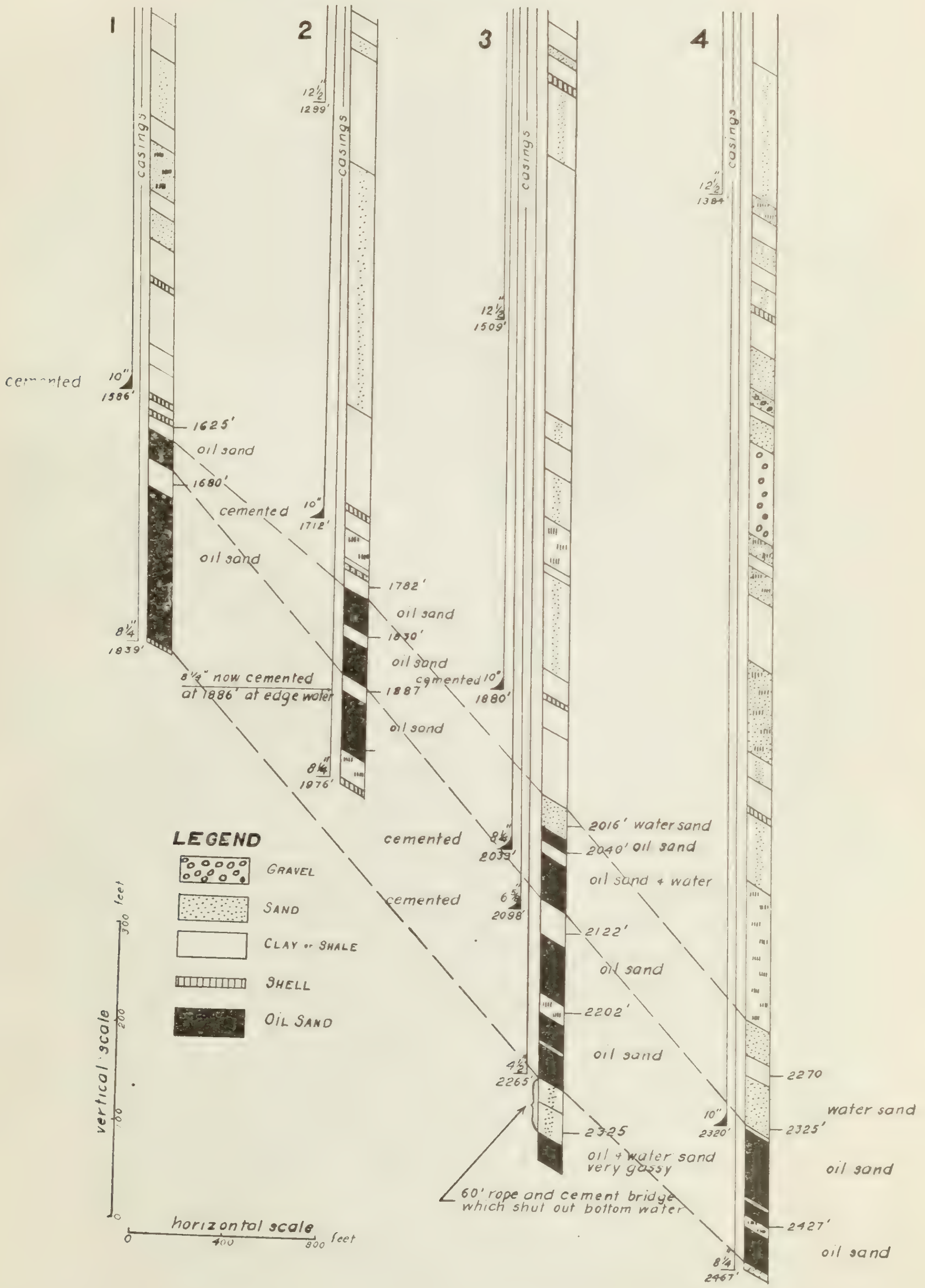
As an aid to quick and uniform drafting, a guide beneath the tracing should have the scale and necessary vertical lines.

Symbols are simplified so that they can be made with a right line pen at the same time that dividing lines between formations are made. Ordinarily, the symbol alone will suffice, without name of formation.

The various drawings of individual wells, along some approximately straight line on the ground, are grouped on a single drawing called a cross section. They must be properly located on the drawing, relative to distances apart and elevations above sea level.

The appearance of such a cross section and its value are illustrated by the following sketch (Fig. 13) of the bottom of four wells in the Coalinga field.

Figure 13 – CROSS-SECTION showing underground relation of four oil wells in the COALINGA FIELD.



The wells were drilled in order as numbered. The strata are not bent or deformed in this particular locality. In each well the 10-in. casing was intended to shut off the water occurring above the oil sands, and in well No. 3 it was landed at a depth of 1880 ft., in conformity with successful results at No. 1 and No. 2. However, the sand between 1980 ft. and 2016 ft. was found to contain some oil and considerable water, hence it was necessary to use more casing to shut off this water. Since some experimenting was necessary, two strings, the 8¼-in. at 2033 ft. and the 6⅝-in. at 2098 ft., were used. Had all conditions been known beforehand only one string would have been necessary, but when the 8¼-in. casing was landed and the well drilled deeper more water was encountered and the 6⅝-in. casing had to be used. The final oil string of casing, 4½-in. in diameter, was carried to 2351 ft. and upon testing, the well was found to produce mostly water, so the bottom was plugged (using waste, rope, iron lathe-cuttings and cement) up to 2265 ft. and the well again tested, when it was found to be free from water.

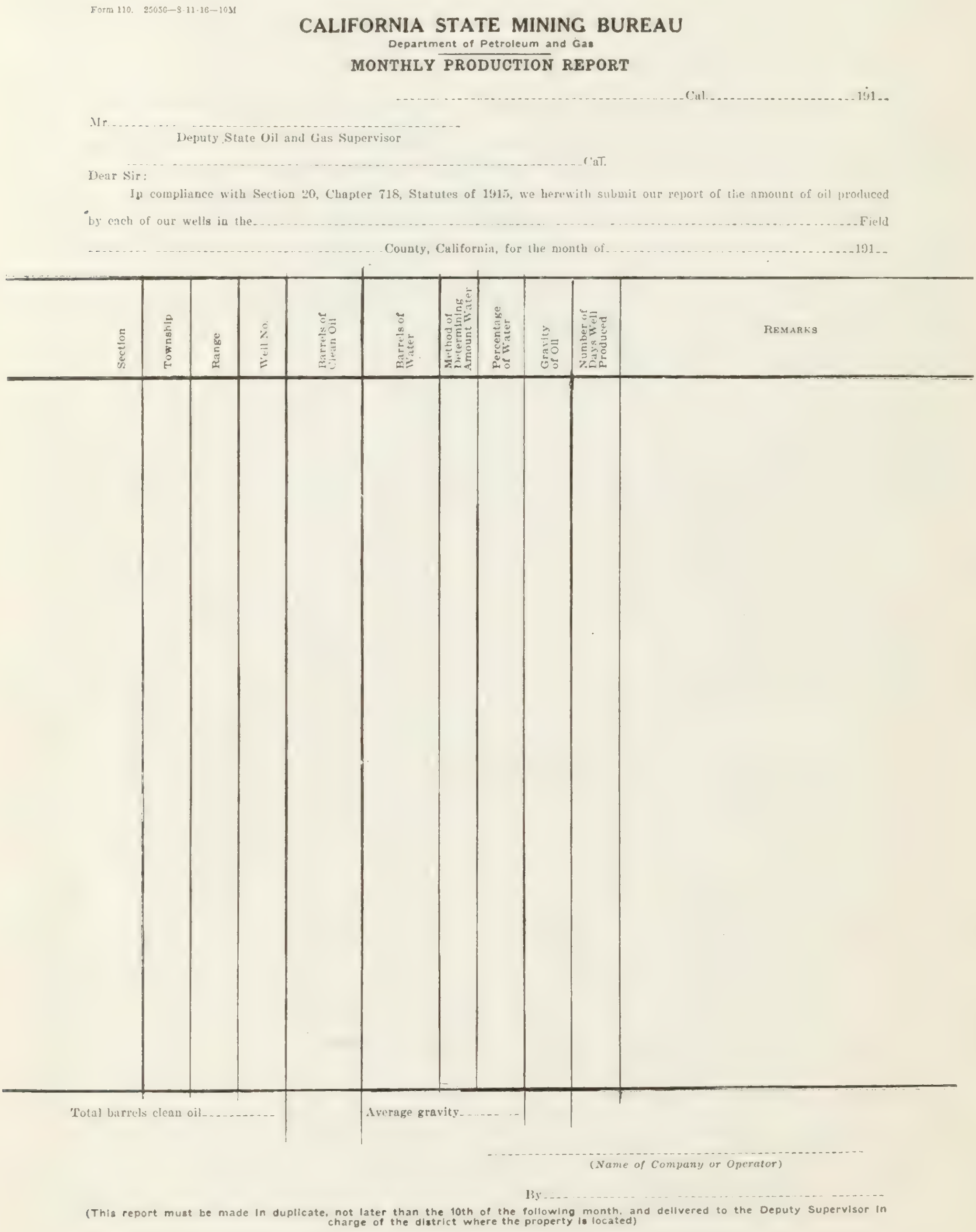
Since well No. 3 was one of the first wells in this locality to encounter water in the oil sands, where oil was expected, careful work was necessary on the next well drilled, to check the operations. This was done on the neighboring wells, not shown on the drawing, and since similar results were found, when well No. 4 was drilled, the top sands were shut off with the 10-in. casing at 2320 ft. The well was drilled to 2467 ft. only, so as not to encounter the sand which contained water in well No. 3 between the 2325 and 2351-ft. levels.

After completion, all these wells produced clean oil for about a year, and then No. 2 began to show a little water, and about three months later showed about 80 per cent. There were three possible sources of the water: From other wells through the oil sand, or from above the oil sand, or from the bottom sands penetrated. The drawing shows that the possibility of bottom water was slight. The possibility of water from above was tested by removing the 8½-in. "oil string," putting a "bridge" or plug in the open hole between the bottom of the 10-in. "water string" and the top of the oil sand. After bailing the well dry above the plug no water came in, proving that the "water string" was not leaking at any point and was effectively excluding upper water. Therefore the water in No. 2 was probably coming through the oil sand itself, and as the same sand showed both oil and water between 1980 ft. and 2095 ft. in No. 3 it was concluded that the water was rising along the dip of that sand as the oil was removed. Such a movement is called the encroachment of "edge water." The 8¼-in. casing was again put in and cemented at 1886 ft. in the shale presumed to correspond to that found at 2091 to 2122 ft. in well No. 3, and 2318 to 2325 ft. in well No. 4. After pumping the well for about ten days, the oil was found to contain less than 1 per cent water, proving that water had been coming through the upper sands between 1782 and 1870 ft. After about four years the water has commenced to show in well No. 1. This movement naturally follows the removal of oil and can not be stopped, but the particular sand affected can be kept separated from other productive sands.

MONTHLY PRODUCTION REPORTS.

Any person giving the slightest consideration to the matter, will readily see that it is necessary to keep continuous records of the production of oil wells, showing the amounts of both oil and water coming from them. Aside from the necessity of such records in tracing the origin and course of water troubles in a group of wells, such records are of the utmost value to the owner of the wells as otherwise he has no means of determining whether or not various wells are paying for their upkeep and operation.

A statement that many oil companies do not really know the actual financial results of their field operations might seem to be an exaggeration, but such is actually the case and the first step necessary in a proper accounting system would be some form of production report, similar to that used by the bureau. The report blank used by the bureau is here shown:



Form 110. 25056—8-11-16—10M

CALIFORNIA STATE MINING BUREAU
Department of Petroleum and Gas
MONTHLY PRODUCTION REPORT

------------------------------------Cal.----------------------191--

Mr.--
Deputy State Oil and Gas Supervisor

--Cal.

Dear Sir:

In compliance with Section 20, Chapter 718, Statutes of 1915, we herewith submit our report of the amount of oil produced by each of our wells in the--Field

-----------------------------------County, California, for the month of--------------------------------191--

Section	Township	Range	Well No.	Barrels of Clean Oil	Barrels of Water	Method of Determining Amount Water	Percentage of Water	Gravity of Oil	Number of Days Well Produced	REMARKS

Total barrels clean oil------------ Average gravity---------

(Name of Company or Operator)

By--

(This report must be made in duplicate, not later than the 10th of the following month, and delivered to the Deputy Supervisor in charge of the district where the property is located)

The monthly production report provides only for collecting the elementary information needed by any operator managing a property. It is believed that very little effort will be required to fill the blank, at a properly operated property. The various terms used on the blank form are here more fully explained.

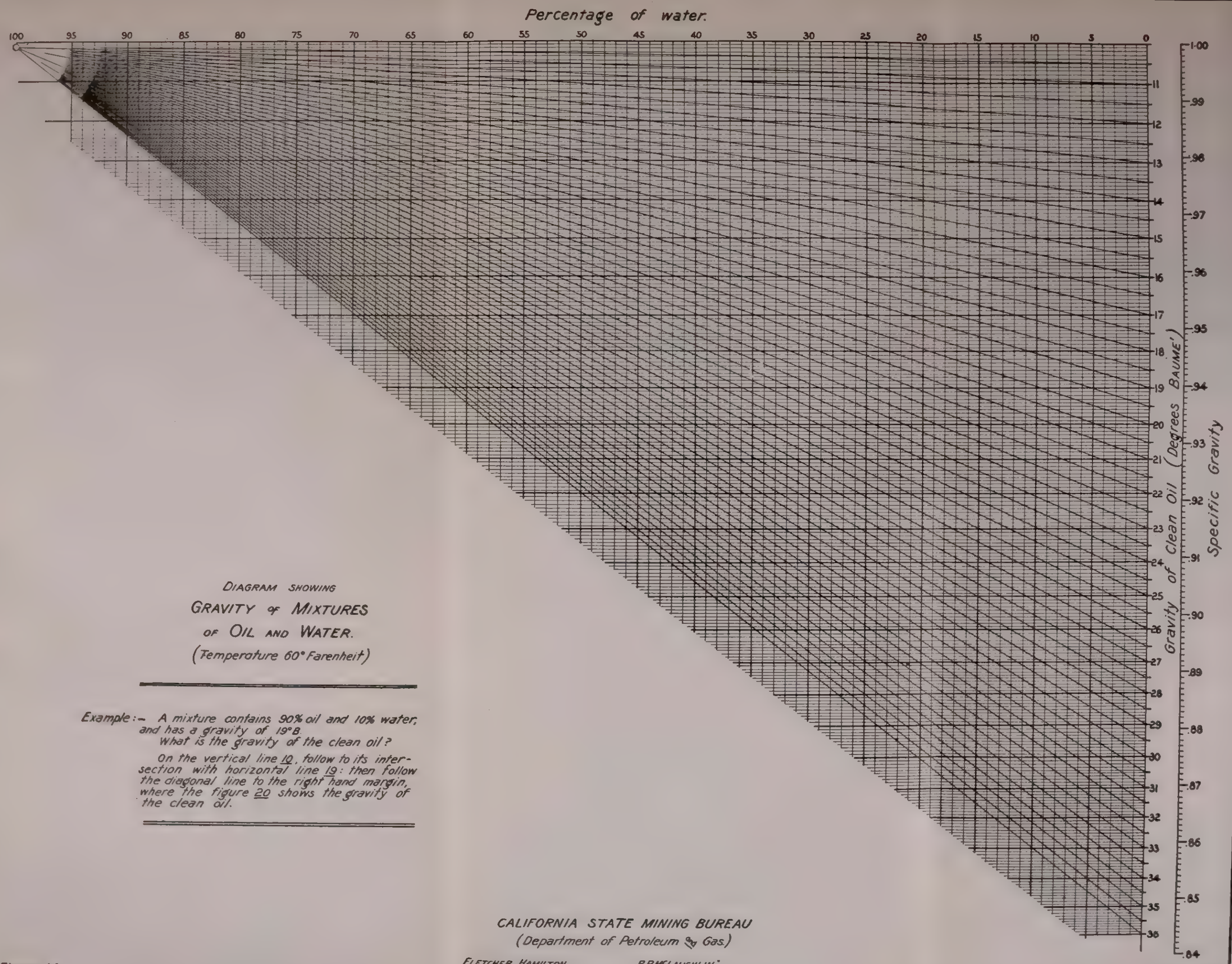


DIAGRAM SHOWING

GRAVITY OF MIXTURES

OF OIL AND WATER.

(Temperature 60° Farenheit)

Example:– A mixture contains 90% oil and 10% water, and has a gravity of 19°B. What is the gravity of the clean oil?

On the vertical line 10, follow to its intersection with horizontal line 19: then follow the diagonal line to the right hand margin, where the figure 20 shows the gravity of the clean oil.

CALIFORNIA STATE MINING BUREAU
(Department of Petroleum & Gas)

FLETCHER HAMILTON,
State Mineralogist.

R.P.McLAUGHLIN,
State Oil & Gas Supervisor.

Figure 14

W.E.CONDON Del.

Barrels of clean oil. This figure should be as accurate as possible, but an actual measurement at each well need not be insisted upon, as the superintendent can ordinarily make a fairly close estimate.

Barrels of water. This figure should, if possible, be obtained by some sort of measuring or gauging system, but if that is impossible it may be computed from results of a centrifuge test made on oil from the lead line. The centrifuge test is frequently quite inaccurate owing to the small volume of the sample tested and the great variation, from time to time in the behavior of a well.

Method of determining amount of water. When some actual measuring or gauging system is used, the letter M should be marked in the space. If a computation is made from a centrifuge test the letter C should be inserted.

Percentage of water. This figure is best determined directly from the amounts of oil and water produced (divide the number of barrels of water by the total number of barrels of fluid), but when either amount is not measured, give the result of one or the average of several centrifuge tests of oil from the lead line.

Gravity of oil. This figure is in degrees Baumé as determined with a hydrometer, it varies but little and two or three tests per year should suffice. The true gravity of oil which is mixed with water can be determined by means of a test of the mixture and a study of the following diagram (Fig. 14).

Number of days well produced. This figure should as nearly as possible eliminate all the idle time. Some operators keep record of the number of hours each well pumps, which would, of course, furnish the best figure for this report.

Remarks. The report should account for every well on the property and this column can be used to state the reason for idleness of any well.

Any officer of the bureau will be pleased to explain to any operator what is desired in filling out this report.

Notice of Proposed Operations.

In order to comply with the law, operators are required to notify the bureau of all proposed work. The following blanks cover all the requirements and will be furnished to all operators:

Form 105. 19216—9-17-15—5000.

California State Mining Bureau

Department of Petroleum and Gas

Notice of Intention to Drill New Well

This notice must be given before drilling begins

---------------Cal.--------------191--

Mr.-----------------------------------

Deputy State Oil and Gas Supervisor

------------------------------------Cal.

Dear Sir:

In compliance with Section 17, Chapter 718, Statutes of 1915, notice is hereby given that it is our intention to commence the work of drilling well number---------

Section---------T.---------R.----------, -------------------------------Oil Field.

-----------------------County. The well is--------feet N. or S., and--------feet

E. or W. from-------------------------

The elevation of the derrick floor above sea level is---------feet.

We estimate that water should be shut off at a depth of about------------feet, more or less.

We estimate that productive oil or gas sand should be encountered at a depth of about----------feet, more or less.

Respectfully yours,

(Name of Company or Operator)

By-------------------------------------

Address notice to Deputy State Oil and Gas Supervisor in charge of district where well is located

Form 16

California State Mining Bureau

Department of Petroleum and Gas

Notice of Test of Water Shut-off

This notice must be given at least five days before the test, and a longer time is desirable

----------------Cal.----------------191--

Mr.----------------------------------

Deputy State Oil and Gas Supervisor

--------------------------------Cal.

DEAR SIR:

In compliance with Section 19, Chapter 718, Statutes of 1915, notice is hereby given that it is our intention to test the shut-off of water in well number------------Section-----------
T.--------------R.----------------, --Oil Field,
--------------------------County, on the------------------day of------------------191--.

Respectfully yours,

(Name of Company or Operator)

By--------------------------------------

Form 107 15218—9-17-15—5000

California State Mining Bureau

Department of Petroleum and Gas

Notice of Intention to Deepen or Redrill Well

This notice should be given fifteen days before work begins

________________Cal.______________191__

Mr.____________________________________

Deputy State Oil and Gas Supervisor

____________________________________Cal.

DEAR SIR:

In compliance with Section 17, Chapter 718, Statutes of 1915, notice is hereby given that it is our intention to commence the work of deepening or redrilling well (Cross out one word) number______Section_____T._____R._____, ______________________________Oil Field, ______________________________County.

The present condition of the well is as follows:

The proposed work is as follows:

Respectfully yours,

____
(Name of Company or Operator)

By_____________________________________

Address notice to Deputy State Oil and Gas Supervisor in charge of district where well is located

Form 108. 19219—1-17-15—5000

California State Mining Bureau

Department of Petroleum and Gas

Notice of Intention to Abandon Well

This notice must be given at least fifteen days before work is to begin

----------------Cal.--------------191-

Mr.------------------------------------

Deputy State Oil and Gas Supervisor

-------------------------------------Cal.

DEAR SIR:

In compliance with Section 16, Chapter 718, Statutes of 1915, notice is hereby given that it is our intention to abandon well number-------Section-------T.------- R.-------, --------------------------------Oil Field---------------------County, commencing work on the-----------day of-----------------------191--.

The present condition of the well is as follows:

The proposed work is as follows:

Respectfully yours,

(Name of Company or Operator)

By-------------------------------------

Address notice to Deputy State Oil and Gas Supervisor in charge of district where well is located

Allowance has been made from time to time for errors or delays in the proper handling of reports and in the furnishing of data to the bureau, because it was to be expected that some misunderstandings should arise in the process of acquainting the many operators of the state with the needs of the new department. If it had been possible to personally meet each superintendent in the beginning, operations would have been simplified. However, in the majority of cases very little, if any, confusion has resulted after once explaining our scheme of operations to a superintendent or his representative.

Our blanks are intended to be as near self-explanatory as could be made. It might be well to consider the forms used to report proposed operations, and to comment on the more common errors made in interpreting the blanks.

Form No. 105. Notice of Intention to Drill New Well.

Each blank space should be used. Give the figures as accurately as possible. It *is* important to give the location of the well and the application is not complete without such data, preferably by inserting the distance north, south, east or west from some corner of the property or section. The elevation should never be omitted and it should be as accurate as possible within a foot.

Form No. 106. Notice of Test of Water Shut Off.

When possible this notice should be sent in at an early date so that the deputy may plan his work accordingly. When an operator neglects to send in this notice and telephones his desire for a test on the following day, he should not be offended in case the inspector is late in arriving at his well. Previous engagement on other wells would have first call. However, no intentional delay would be caused by this department. Moreover the operator should see that the report is mailed into this department, properly filled out, even if the test has already been made by the inspector, as written approval will be withheld until its arrival for our files.

Form No. 107. Notice of Intention to Deepen or Redrill Well.

First, note that no approval for work of this character can be granted unless a copy of the log of the well in question has previously been furnished to this department. In stating the "present condition of the well," insert casing record and state, if possible, the condition of the water string and whether or not it is to be disturbed. Many of these proposals represent redrilling of only the oil strings to original depths, and in such cases where the water string is in good shape, an approval can be granted immediately. In case the well produces some water, an effort should be made to locate the source of the water, by testing the water string.

Form No. 108. Notice of Intention to Abandon Well.

If a graphic log is available, a copy should accompany a proposal of this nature, and the details of the plan of abandonment should be stated fully. Another sheet of paper should be used if necessary. An operator should not wait until the crew had finished rigging up and is ready to begin work, before sending in a notice of this character, as it often takes time to study out the facts involved.

Mention should be made of the manner in which the Honolulu Consolidated Oil Company have always presented data in a proposal for a redrilling, deepening, or abandoning job, because of the assistance that it has been to this department in handling the proposals. The regular official blank is accompanied by a blue print, showing graphically the portion of the well under consideration. The print also carries a brief description of the facts leading up to the present condition of the well, each change being enumerated so that one can readily get the exact status of the well with a few moments study. Likewise the proposed work is succinctly set forth on a separate page, and the likelihood of any subsequent misunderstanding is practically eliminated. The proposals received from the K. T. and O. Company and from the General Petroleum Company are handled in the same efficient manner.

The benefits to an operator in furnishing the bureau all the information requested, can scarcely be overstated; a single example may suffice.

Frequently owners of old wells have desired to abandon them and recover such casing and other material as possible, but feared to do so, owing to the liability for damage done to the property or some other adjoining land. Some such cases have been presented to the bureau, where the owner expected to have to expend considerable sums of money in plugging the wells in such a manner as to forestall possible legal actions. In a number of these cases a complete file of all records of the well enabled us to approve the abandonment, without requiring any work, and at the same time furnish the operator with evidence that no damage had been done.

While discussing the importance of systematic work and its value to the oil operators themselves, entirely aside from legal requirements of this department, it may be well to explain the functions of an engineer or geologist which seem to be understood by comparatively few oil men.

At the present time, fortunately, it is not necessary to point out the usefulness of a geologist in choosing new or prospective oil lands. Most operators of importance now realize that systematic study of earth conditions, by a specially trained man, is a better method to pursue in planning investment of money, than to merely spend it on incomplete information and then plan how to recover it. Consequently geologists are usually employed before drilling begins. However, there are too few companies who realize the importance of continuing to properly use the services of a geologist or engineer after the land has been selected and development commenced.

The larger operators, of which there are possibly a dozen in California, will particularly benefit by considering this question. Possibly the small and comparatively inactive concerns would not be justified in the expense of attempting to individually make use of such work, but several such companies could profitably join in employing a competent engineer.

It must be clearly borne in mind that the work of this bureau covers only the prevention or repair of damage. The bureau has neither the facilities nor inclination to direct the management of private properties. It will however assist operators, whenever it is possible, to solve their problems.

The work of the bureau during the past year has not been directed to a study of operating conditions, but observation of them could not well escape notice, while the regular work was being carried on. In fact, a most excellent opportunity has been afforded to compare various methods. This broad field of observation justifies the statement that *there is probably no large business so inefficiently conducted as is that involved in the production of oil in California,* notwithstanding the fact that mechanical operations here seem to be more advanced and improved than in any other part of the world. The annual losses, due to unsystematic work and actually paid out of pocket, amount to hundreds of thousands of dollars. Bankruptcy would speedily follow such management in any line of business, not dependent upon either a most abundant natural supply of crude material or fresh infusions of capital from other sources. These two alleviating conditions can not be expected to continue indefinitely.

The producing branch of the oil business is, of course, all important because all other branches of the business depend directly on it. It will be clearly realized, by any reasoning person, that to economically extract oil from its natural underground reservoirs requires the most complete knowledge possible on two subjects: First, the natural or geological conditions governing the creation and preservation of the reservoirs, and second, the artificial or mechanical conditions created near the reservoir by efforts to drill wells and extract the oil. There is absolutely no other way of utilizing the necessary knowledge than by placing the sole responsibility of outlining and directing all development work in the hands of men who possess such knowledge. The solution of the problem, to use other words, requires engineering skill. Such a statement is not theoretical or visionary, and its correctness is proved by the consideration of other and similar industries, such as the mining of the important metals, in which development work is directed as an engineering problem. Further proof that twentieth century methods, using technical skill, are applicable to the oil-producing business is furnished by the fact that three of the largest companies in California are employing such a system.

There has been a hazy notion, among oil operators, of the value of the geological information and numerous concerns have made an effort to collect it but have stopped short when it came to applying it. The bureau has frequently had most elaborate and expensive geological data presented to it in the form of records, only to find, on pursuit of an inquiry that the so-called geological department of a company had no knowledge as to whether the so-called operating departments had followed the preliminary suggestions and furthermore, had no knowledge of facts subsequently developed by drilling operations. The inefficiency was found to not simply end with the disclosure that the operating departments had no knowledge of the preliminary work of the geological departments but really had no connected knowledge or records of their own drilling work.

A single example, chosen at random from numerous cases, may be used to illustrate the results of such lack of system. A well costing about $50,000 developed water trouble and had never been a satisfactory producer. The supposedly complete record of the well, as furnished to the bureau by the owners, simply showed that a string of casing had been properly cemented below the water sand and above the oil sand. The owners had no definite opinion as to the cause of the trouble and even expressed an inclination to plug and abandon the well, charging the expense of drilling the well to profit and loss.

Further inquiry by the bureau caused a more extended search for records kept by owners and developed the fact that several hundred feet of casing had been lost during drilling operations and was left in such a position that it might form an almost ideal channel, through which the overlying water might descend to the oil-bearing formation. Notwithstanding the amount of money invested in the well, there had apparently been no steps taken to either demonstrate or disprove such a possibility. This particular well may, of course, be repaired under the direction of the bureau but it seems almost incredible that a large company, merely seeking profit from its invested money, could have allowed such a condition to arise and exist for several years. The employment of a competent engineer, authorized to gather all the facts and see that his recommendations were carried out, would prevent such wastefulness and relieve the superintendent of unjust criticism for not attending to details, which he could not possibly carry along with those of his routine work.

In addition to the three very large companies employing up-to-date systems in developing their lands, there are a number of smaller, yet important companies, whose methods are so systematic and whose records are so valuable that study of some of them would be useful to all operators desirous of improving their own methods by comparison with results obtained by others.

SUMMARY OF WORK BY FIELDS.

The areas covered by various deputy supervisors together with an idea of the amount of routine work handled by them may be shown by the following tabulation:

Routine Notices and Decisions.

Operator, address and district	New wells	Shut off	Deepened	Redrilled	Abandoned	Acres proved land	Number of producing wells
M. J. Kirwan, Coalinga, Cal.—Coalinga, Lost Hills and Belridge	141	148	41	159	28	15,333	1,200
C. Naramore, Taft, Cal.—McKittrick, Midway, Sunset and Kern River	273	280	56	111	52	52,899	3,718
R. B. Moran, 520 Union League Bldg., Los Angeles, Cal.—Los Angeles, Orange and Ventura counties	59	51	16	7	34	6,380	1,755
R. E. Collom, Santa Maria, Cal.—Santa Maria and outlying districts	12	16	12	3	3	6,090	356
Totals	485	495	125	280	117	80,702	7,029

The unequal division of the work is quite evident but could not be avoided owing to the natural grouping of the various fields and the limited funds available. An attempt to equalize matters and give better service was made by having Mr. Collom at the Taft office with Mr. Naramore for a part of his time.

The work done by M. J. Kirwan is quite fully covered by his own report (pages 60 to 115), but no reference is made by him there, or anywhere else, to the fact that the money available for this department last year made it necessary for him to enter the state service for a smaller salary than he had previously received from Fresno County, and that the state service required him to cover more territory and do more work. Fortunately these conditions will be somewhat alleviated during the present year. The average reader of his report would not be advised thereby, that his work during the previous years had been so well done that he is undoubtedly more completely informed as to underground conditions in the Coalinga field, than any other person. Due to the broad vision of the Coalinga operators, who utilized the previous law to employ an engineer of Mr. Kirwan's type, as Oil Well Commissioner, water conditions were better understood there than in any other field at the time this department was created. Among the advantages of the present law to the operators of that field, is the fact that means are afforded whereby the information collected can be definitely put into use.

The knowledge that there are powers of compulsion back of the present law, has resulted in greater care being exercised by operators in all work affecting water conditions, and the advice of this department is requested to a greater extent than was similar information under the previous law. During the past year funds were not available to actually repair offending wells, but this will probably be necessary at a few places during the present year.

The fulfillment of our expectations of being able to offer constructive advice in new work, in addition to merely remedying past mistakes, is illustrated in the instance where a productive sand was exposed, rather than being flooded, upon the information furnished by this department.

The work of this department has also caused greater attention to be paid by operators, to the matter of records of production of their wells, an elemental factor in proper accounting and management, which has been frequently overlooked.

An advantage to Coalinga operators can scarcely fail to develop merely from the publication of the detailed report, setting forth summaries and conclusions as to geological conditions.

The lists of records received, and similar data, clearly indicate those operators who are lax in assisting in the work of protecting the field and when such negligence is clearly exposed, public sentiment may be expected to serve a useful purpose without recourse to legal methods. The list of complaints received, and the manner of their disposal is interesting and self explanatory. Particular attention is called to the subject of "edge water" in the Coalinga field. This encroachment means that the problems being dealt with are subject to constant change.

The work of Mr. Chester Naramore during the past year was particularly difficult, owing to the large territory covered, the absence of detailed information at his command and a feeling of uneasiness among operators, that enforcement of the new law might work great hardship. His thorough knowledge of the oil business and of the advantages to be gained through cooperation of the operators, are responsible for the successful work of the department in the Kern County fields.

A careful study of his detailed report (pages 116 to 172), shows, that while many operators have cooperated with us and complied with the law by furnishing the necessary logs and production reports, there are still so many records not yet received that a detailed summary of field conditions is impossible.

In a field where there is much undeveloped land and drilling of new wells is going on continuously, it is, of course, most important to see that the new work is done in such a manner as not to cause damage. The list of tests which were made under the direction of this department at both new and old wells, speaks for itself as to the steps taken to prevent future damage. The pains taken to see that wells are properly plugged when being abandoned is particularly important because it is frequently almost impossible to again work on a well when it is once abandoned. The list of complaints filed, and action taken, shows the extent to which operators have relied upon the department.

Most important of all the work, however, is that devoted to showing operators the methods necessary for them to pursue in systematizing their own work, and a substantial advance has been made along this line.

The problems presented in the territory covered by Mr. R. B. Moran in Los Angeles and Orange counties are undoubtedly more difficult than in any of the other California oil fields. This is largely due to the fact that many of the operators there do not yet realize that it is unprofitable to attempt to lift both oil and water from a well. No general effort was ever made to study or correct water damage before the passage of the present law and it was commonly reported either that there was little or no water trouble in the fields, or on the other hand, that where it did exist it was so widespread as to be incurable. In a community where such ideas were prevalent, it is not surprising to find that a number of operators have not yet filed well logs, which is the first step toward receiving the benefit from the work of this department.

The facts set forth in Mr. Moran's report (pages 173 to 191), show the presence of considerable water in various localities. These facts also show that the damage is not uniform, but that it is localized around certain wells or groups of wells, and can therefore be profitably remedied, without the necessity of repairing all wells.

When a practically complete list of logs has been filed, it will be possible to outline systematic plans for the improvement of present bad conditions. The list of decisions rendered on various wells, speaks for itself, as to the work done to prevent future damage from improperly drilled or abandoned wells. One of the cases of abandonment under the direction of this department prevented a lawsuit that would have probably occurred had there been no inspection.

The work of Mr. R. E. Collom in the Santa Maria fields was difficult for the reason that no concerted effort had been previously made to study the underlying reasons for water entering the oil sands, the previous law having been chiefly utilized in the cementing of wells. His report represents the sort of work that this bureau must do in nearly all the other fields before systematic campaigns for improvement of conditions can be outlined.

Possible criticism, that the report of Mr. Collom (pages 192 to 211) is of such a technical nature as not to be understood by most oil men, can be answered by calling attention to the fact, that the author resides in the same community as the operators and constantly discusses with them the points which are covered by the written report, and also that enough companies will in the future employ technically-trained men so that a technical report will be generally useful.

It was possible to complete this work at Santa Maria because there was a comparatively small amount of routine work, such as accompanies the drilling of new wells and also because Mr. Collom was intensely interested in solving the problem before him.

It will be noted here, as in other fields, that the systematic study which is necessary to intelligently repair or prevent damage also reveals possibilities for increasing production and developing oil sands that might otherwise escape notice by some operators. There is one such case clearly set forth in the Santa Maria field and should not escape the attention of an interested and careful reader. The relative inactivity in the Santa Maria field during the past year which made it possible for us to completely study the situation at the same time, prevented extensive work on wells, looking to the definite location and repair of trouble, because it is most economically done by operators in conjunction with other work. Probably active development conditions during the next year will be such as to justify considerable repair work.

It must be particularly noted that the large amount of water being produced comes from a limited number of wells, which clearly indicates the possibilities of remedying conditions. It was our intention to make a number of experiments with dyes introduced into wells under such conditions that results might be carefully observed at neighboring wells. If properly carried on, such tests must certainly yield valuable results. The present extremely high cost of all dyes makes such work impossible on any extensive scale.

FINANCIAL STATEMENT.

The money received from collection by assessment comprises the oil protection fund and is used for two purposes: First, for the supervision by the Petroleum Department of the State Mining Bureau, and second, for the repair of oil wells. The rates are determined in accordance with sections 23, 24, 25, 46, of chapter 718 of the Statutes of 1915. The detailed method is as follows:

The sum of $45,000 is annually available for the support and maintenance of the department, and in subsequent years the assessment may be expected to cover only that amount. This year, however, the amount is much larger and includes $10,000 for providing equipment and and also $20,000 for return to the general fund of the state, from which such an amount was transferred for the maintenance of the department from the time of its creation until funds were available from collection of assessments, and $75,000 to be used in repairing wells. One-tenth of the total of $150,000 is levied upon the oil land of the state. The remaining nine-tenths is levied upon the oil produced and the gas produced and sold. For the purpose of this assessment 10,000 cubic feet of gas is considered equal to one barrel of oil. The amounts of land, oil and gas and the number of producing wells in the various counties were determined to be as follows:

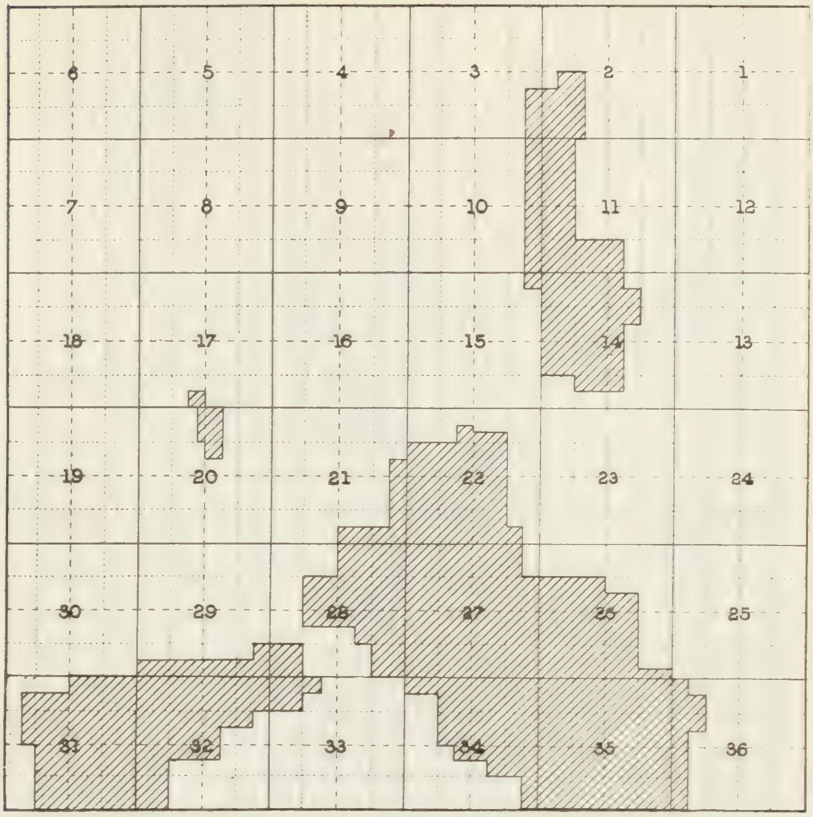
Producing Wells, by Counties.

County	Land (acres)	Oil (barrels)	Gas (10M)	Wells (number)
Fresno	12,218	13,641,325	1,367	830
Kern	55,842	53,041,069	1,355,505	3,873
Los Angeles	1,946	2,673,598	31,770	564
Orange	3,305	12,535,457	42,019	414
Ventura	749	872,020		318
Santa Barbara	5,900	5,450,534	59,539	403
San Luis Obispo	172			
Santa Clara	30	16,617		7
Totals	80,162	88,230,620	1,490,200	6,409

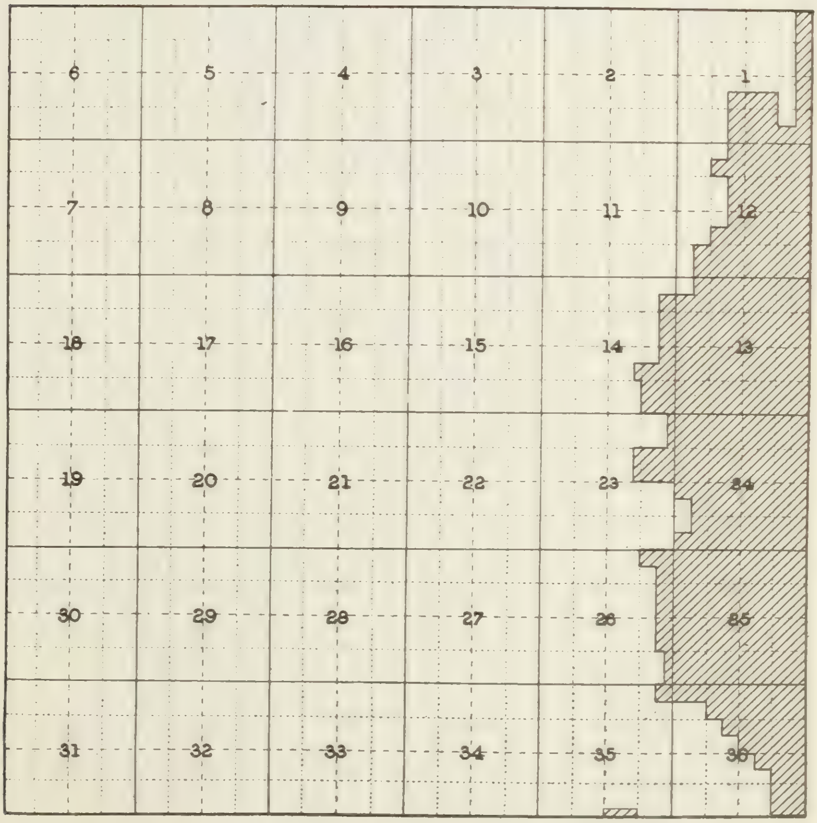
The money to be used in repairing wells is available for use only in the county where it is collected. Expenditure in repairing wells is to be repaid by satisfaction of a lien upon the property where the work is done and therefore little or no further assessment is to be expected for repairs. The rates applied in levying the total assessment for 1916–1917 were $0.1876 per acre of oil land and $0.00151 per barrel of oil or per 10,000 cubic feet of gas.

The land assessed was only such as had been proved to be productive of oil, the principal factor in such proof being completed wells; but known geological conditions were also considered. Details of most of the proved areas are shown by the following township plats:

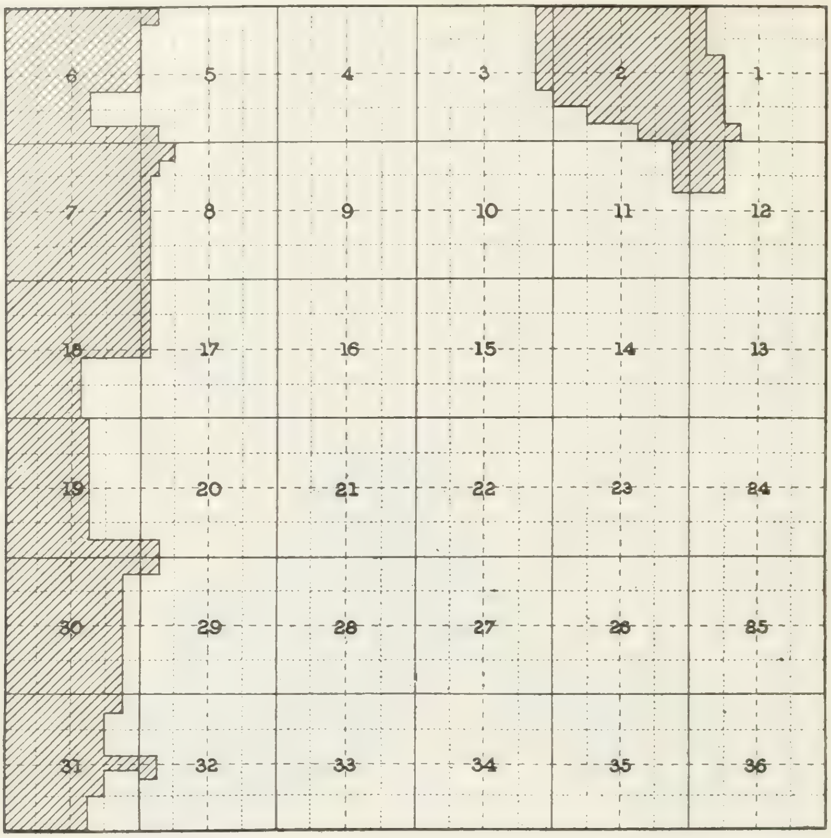
T. 19 S., R. 15 E., M.D.M. — FRESNO COUNTY.



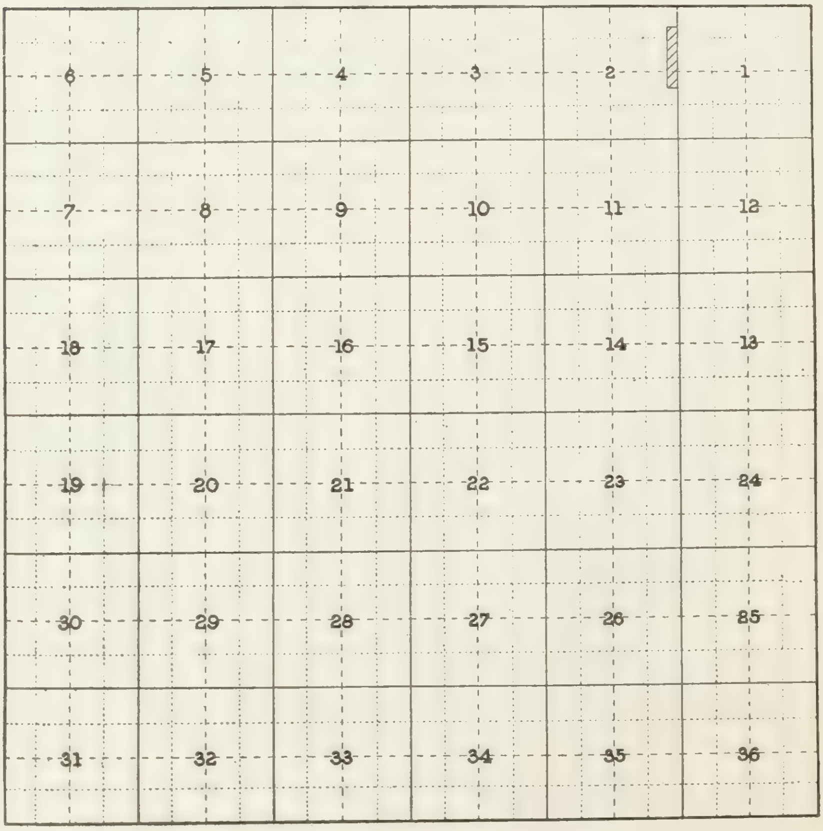
T. 20 S., R. 14 E., M.D.M. — FRESNO COUNTY.



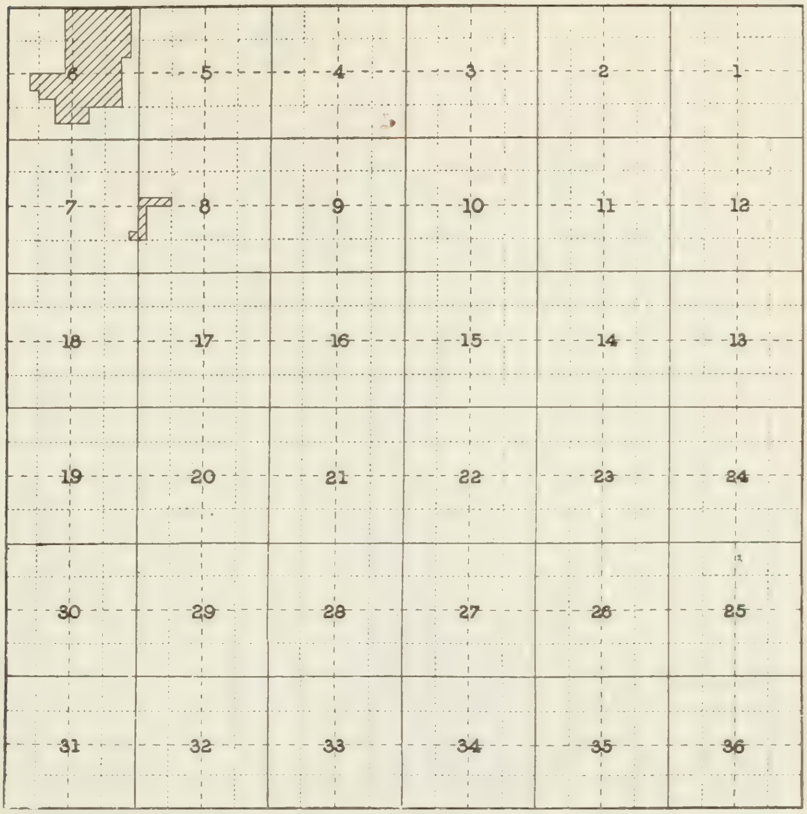
T.20 S., R.15 E., M.D.M. — FRESNO COUNTY.



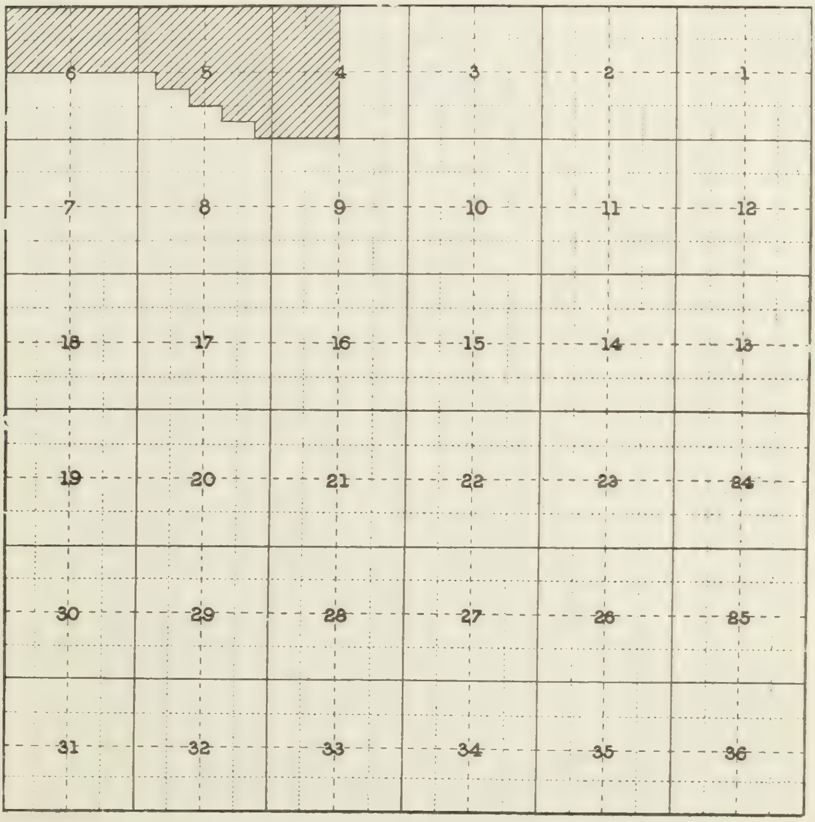
T.21 S., R.14 E., M.D.M. — FRESNO COUNTY.



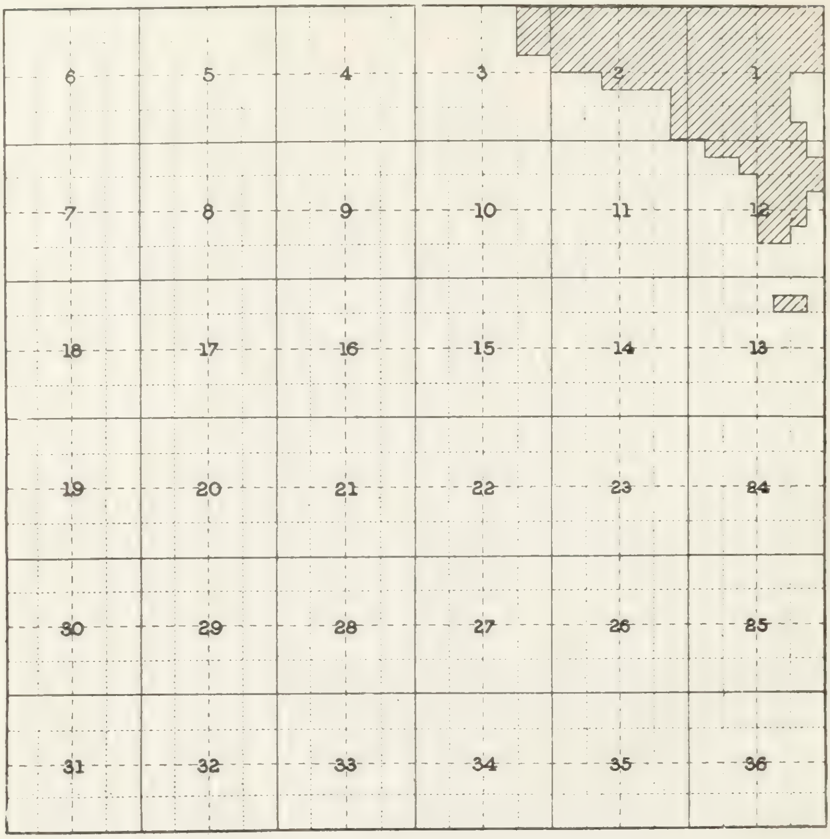
T.21 S., R.15 E., M.D.M. – Fresno County.



T.11 N., R.23 W., S.B. M. – Kern County.



T. 11 N., R. 24 W., S. B. M. — KERN COUNTY.



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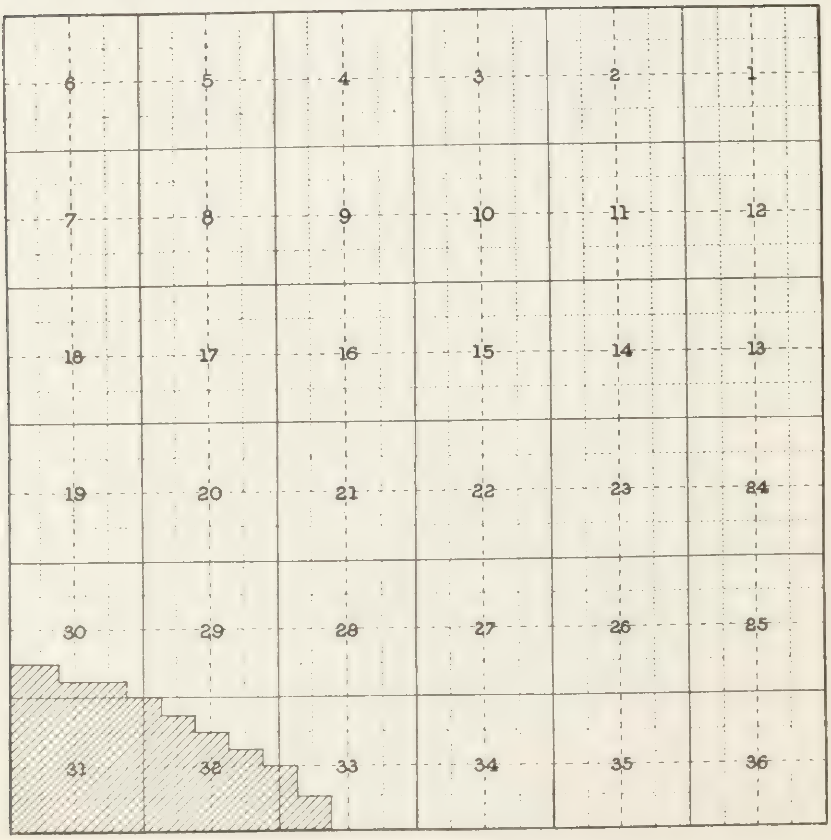
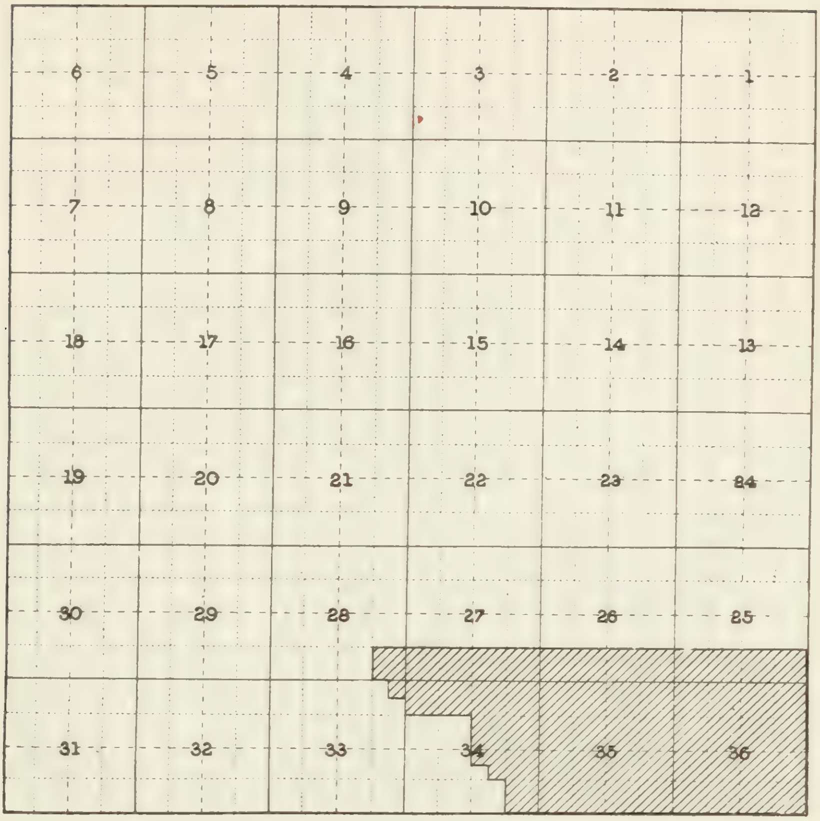


T. 12N., R. 24W., S.B. M. — KERN COUNTY.



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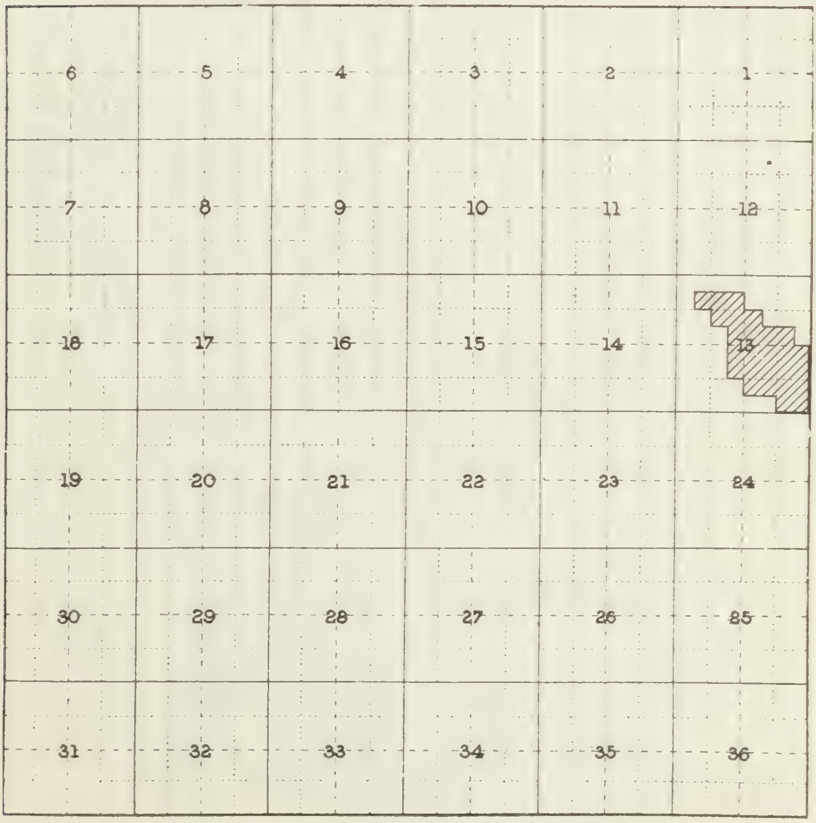

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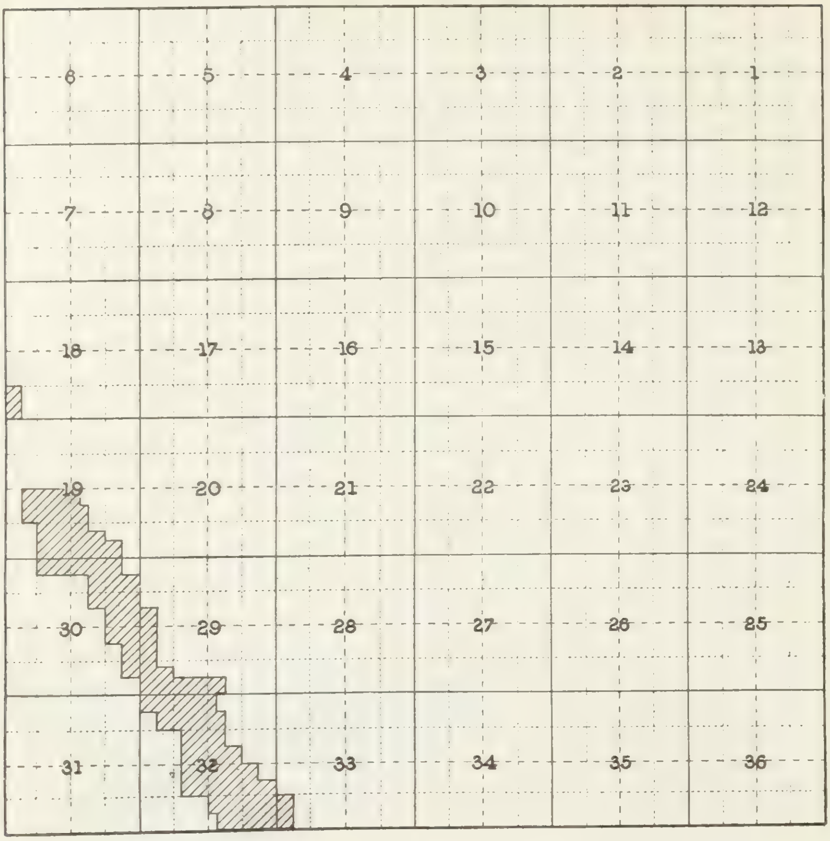

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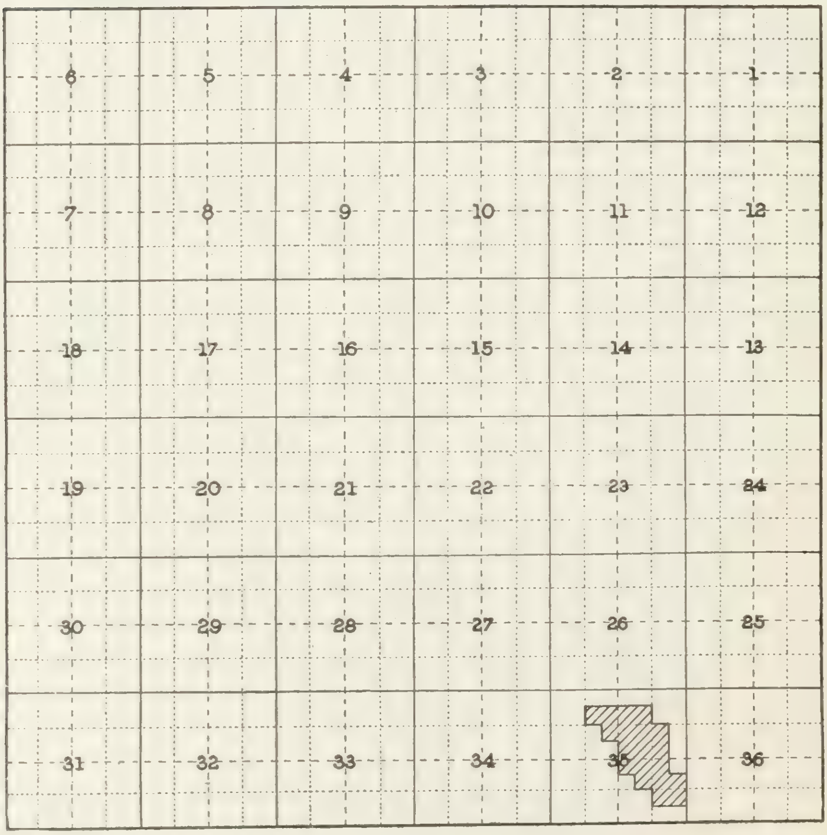

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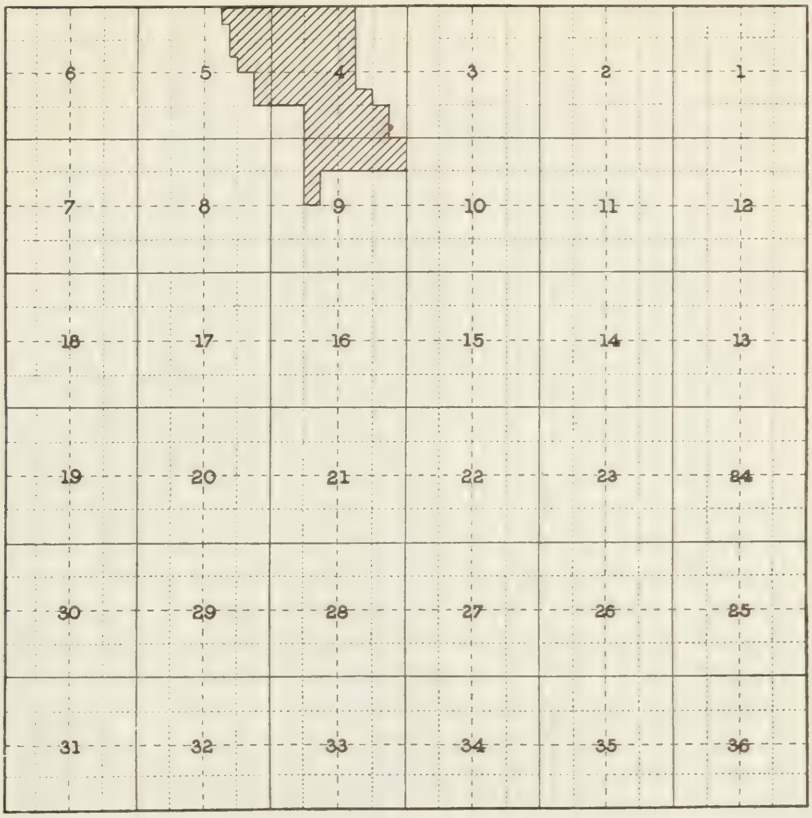
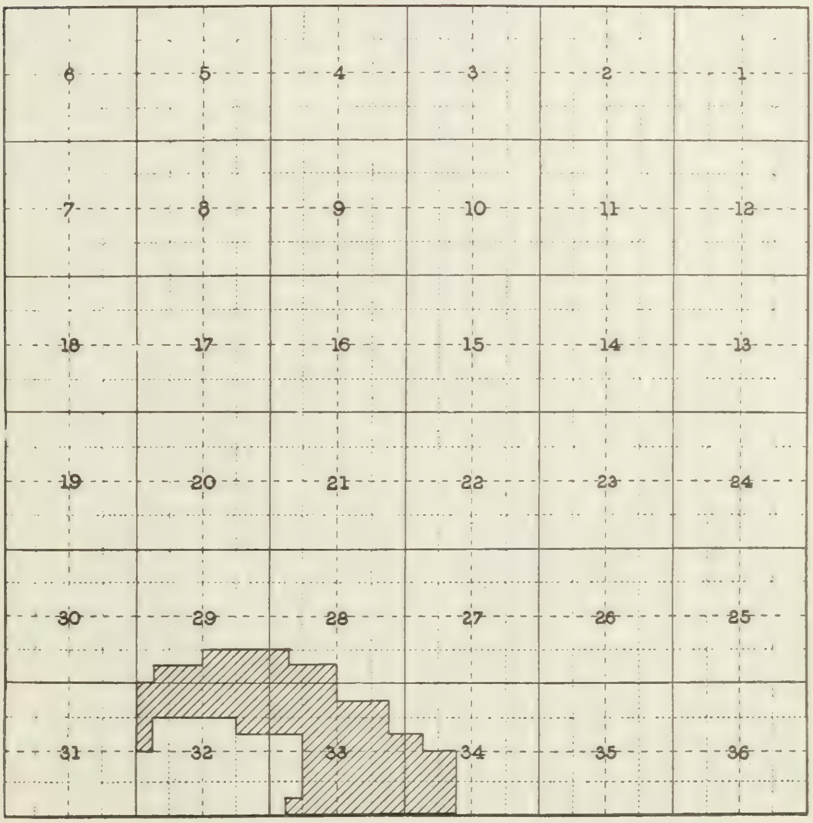


T. 28 S., R.21 E., M.D.M. — KERN COUNTY.



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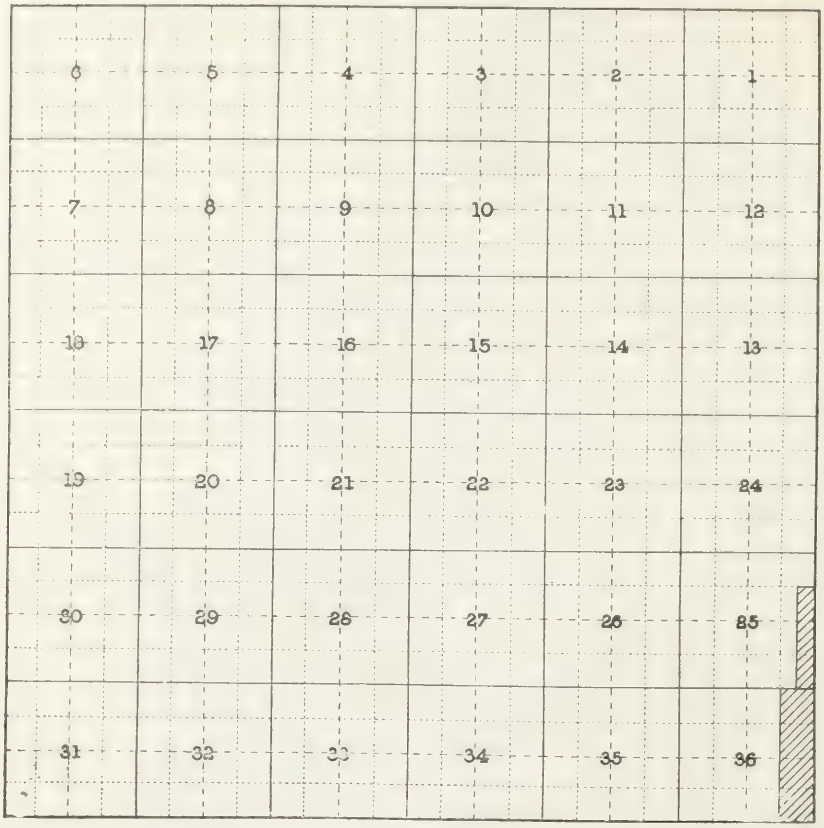

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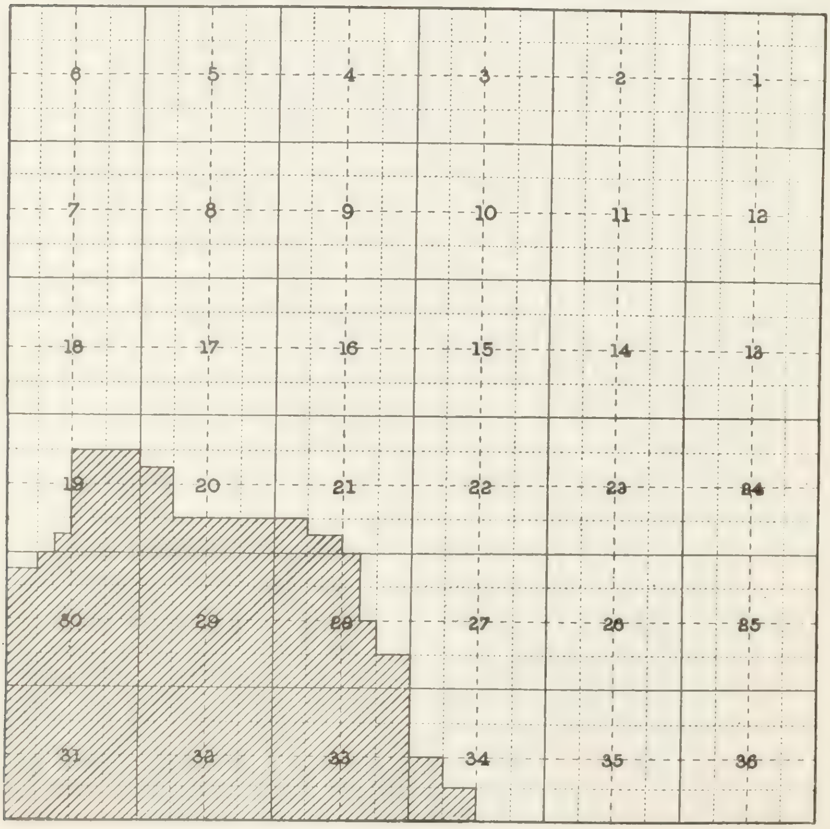

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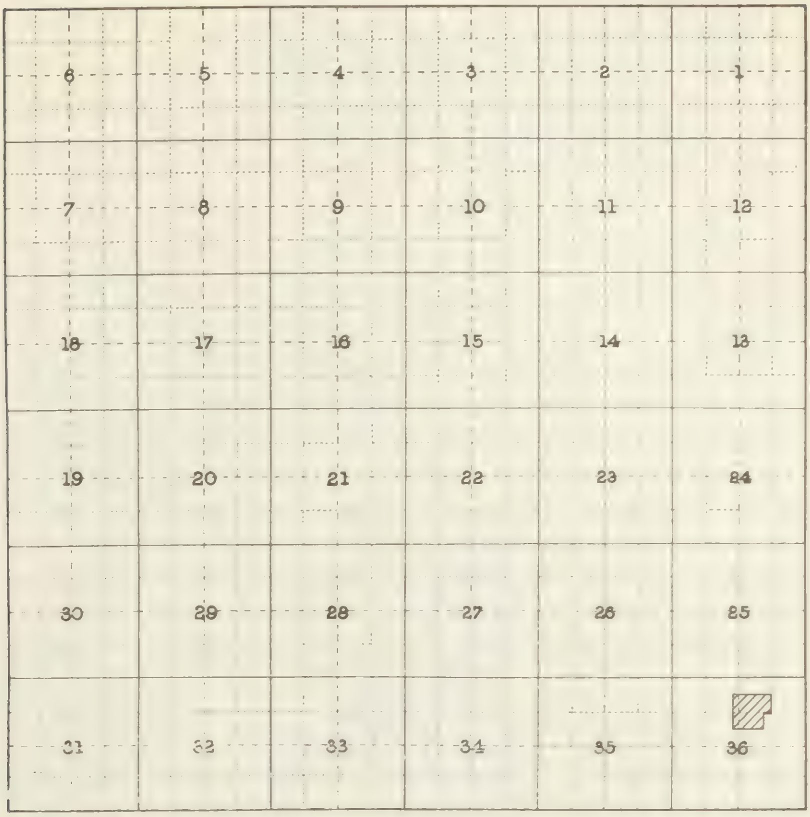

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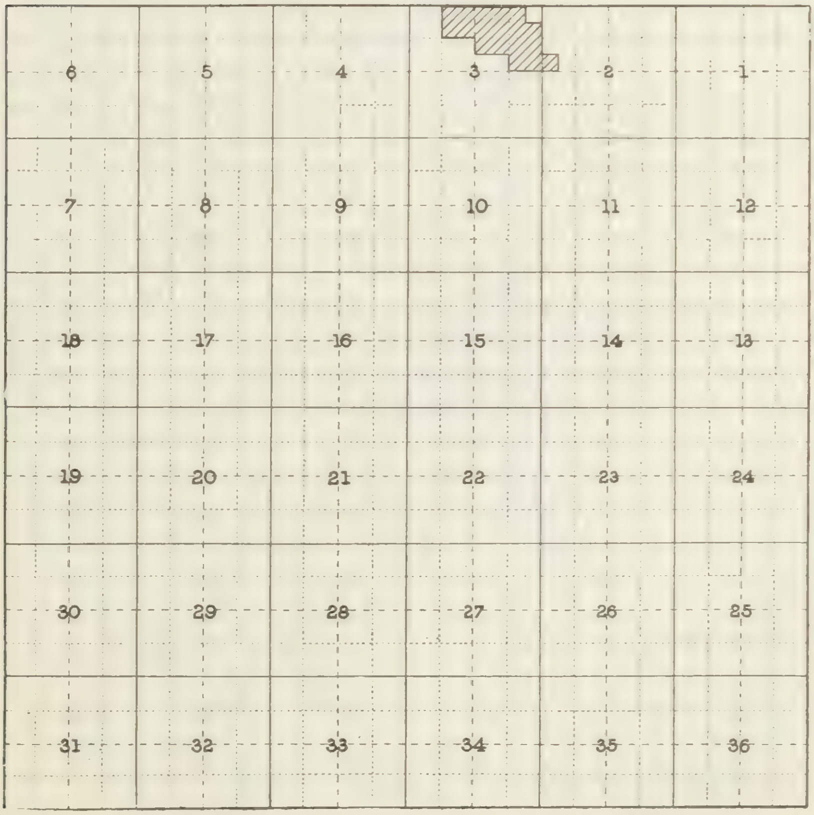
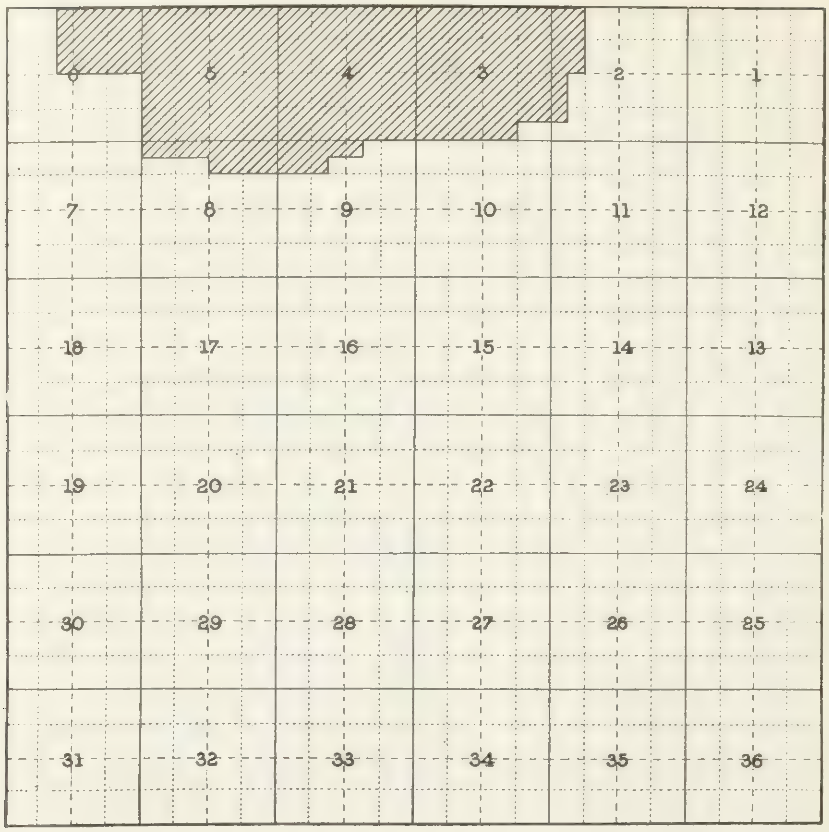
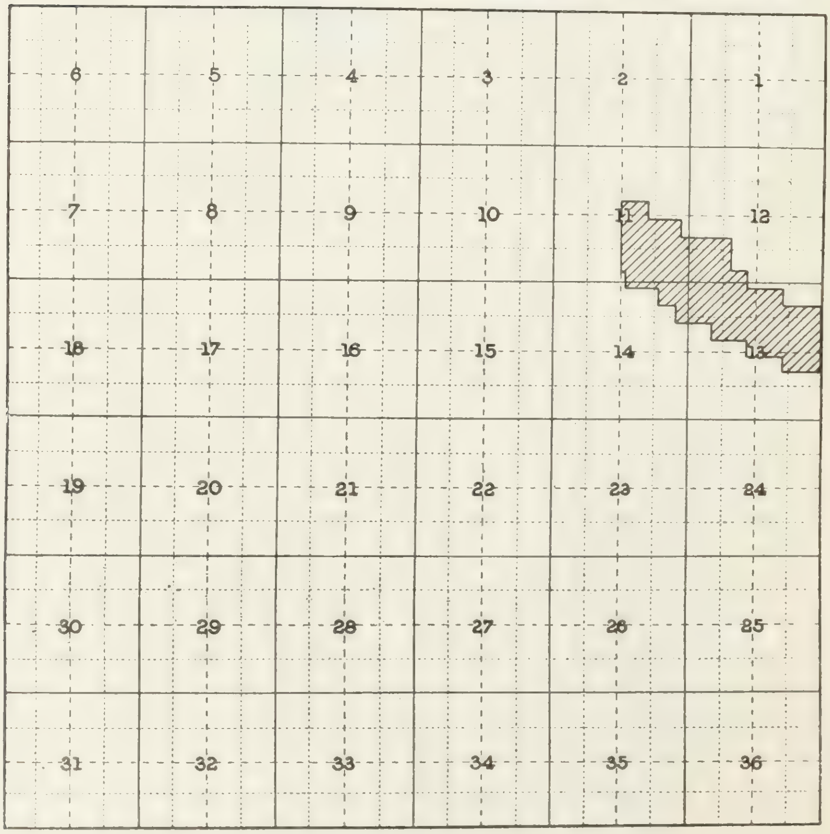


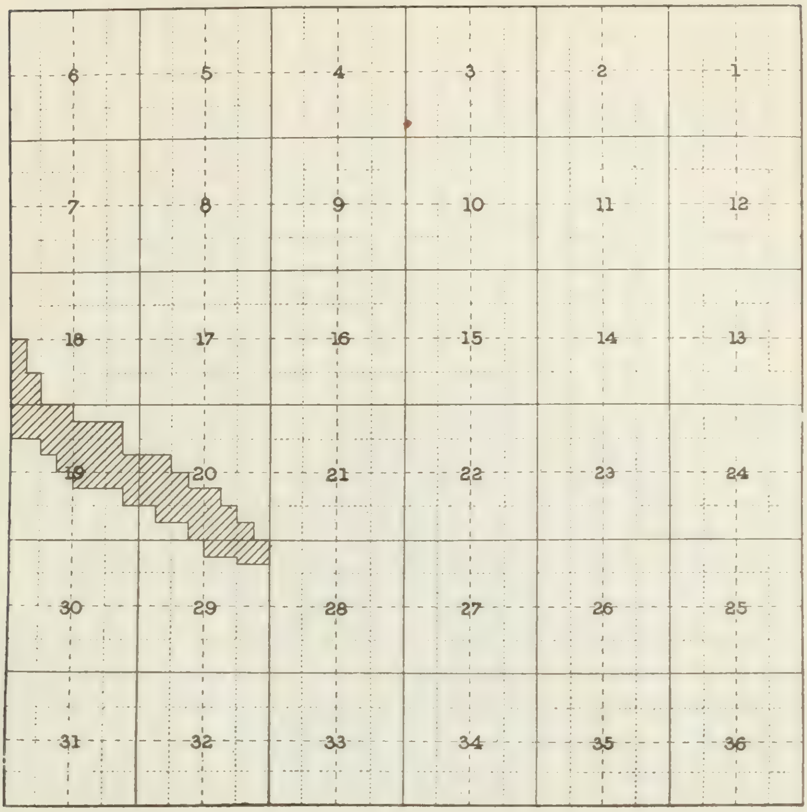
T.29 S., R.28 E., ... M. — .... KERN .... COUNTY.



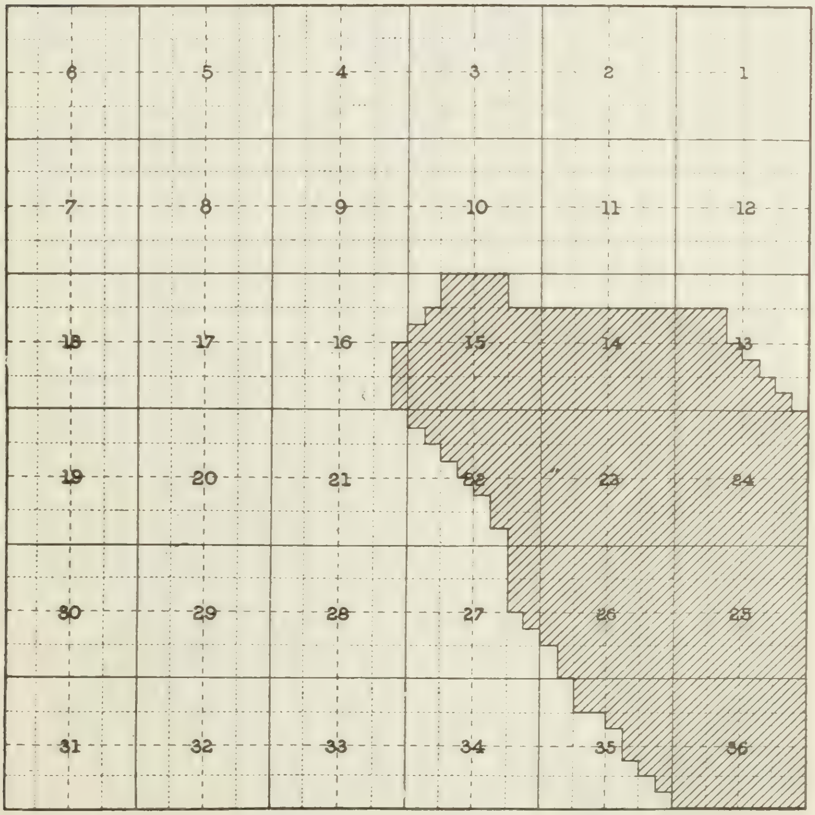
T.30 S., R.21 E., M.D.M. — .... KERN COUNTY.



T. 30 S., R. 22 E., M.D.M. — KERN COUNTY



T. 31 S., R. 22 E., M.D.M. — KERN COUNTY.



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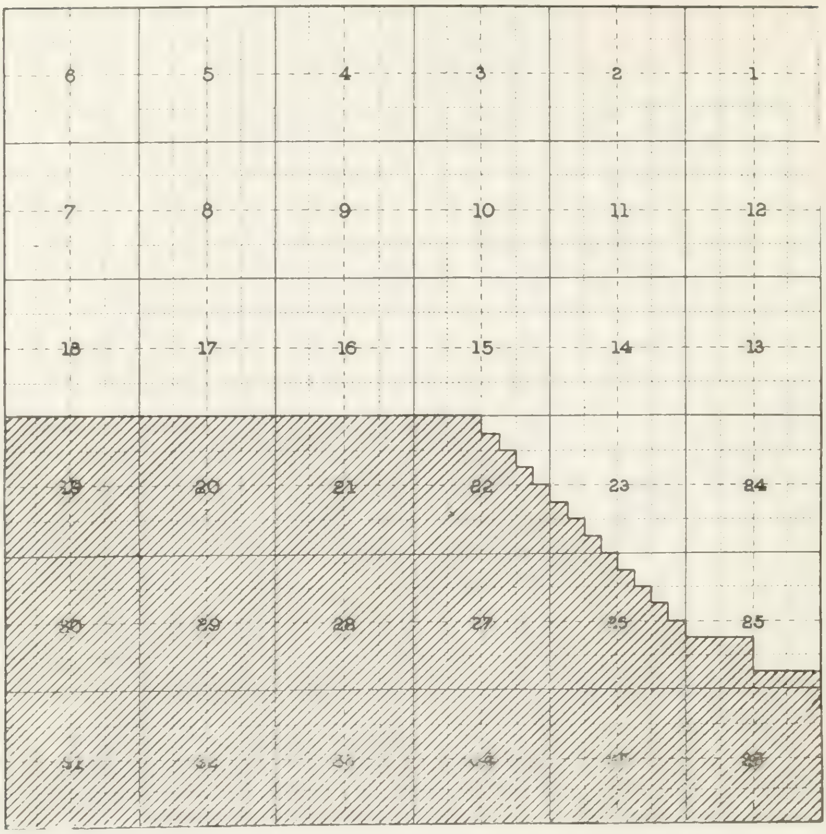

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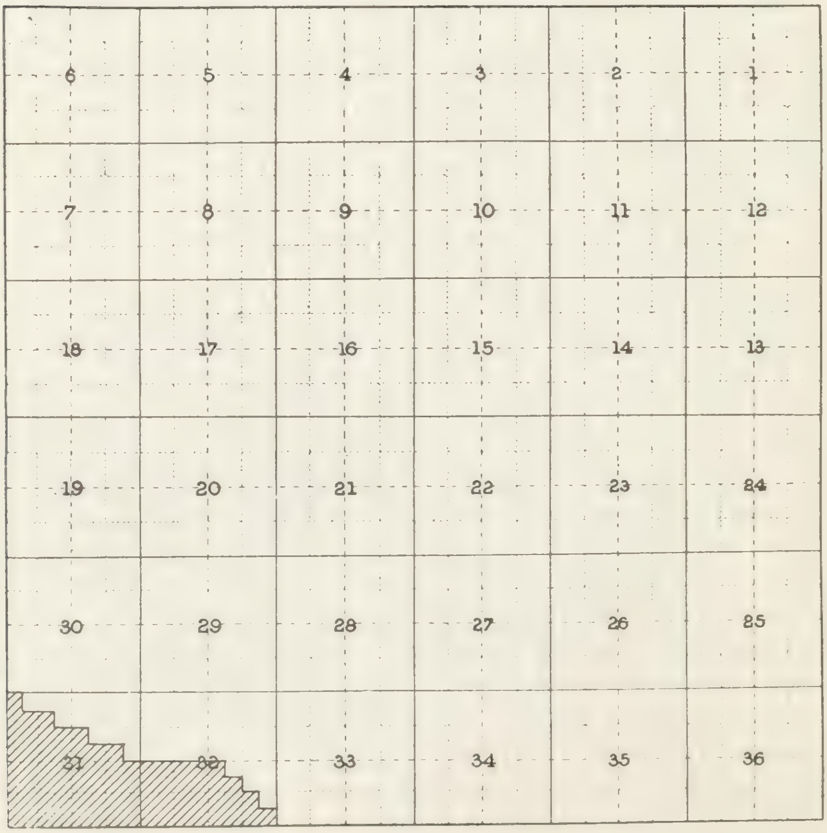
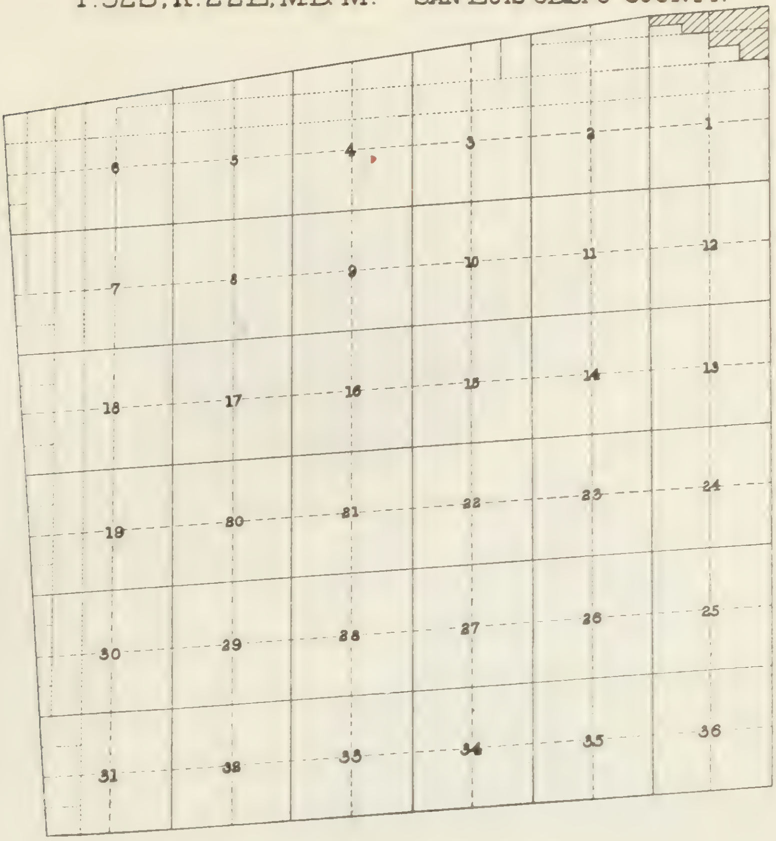
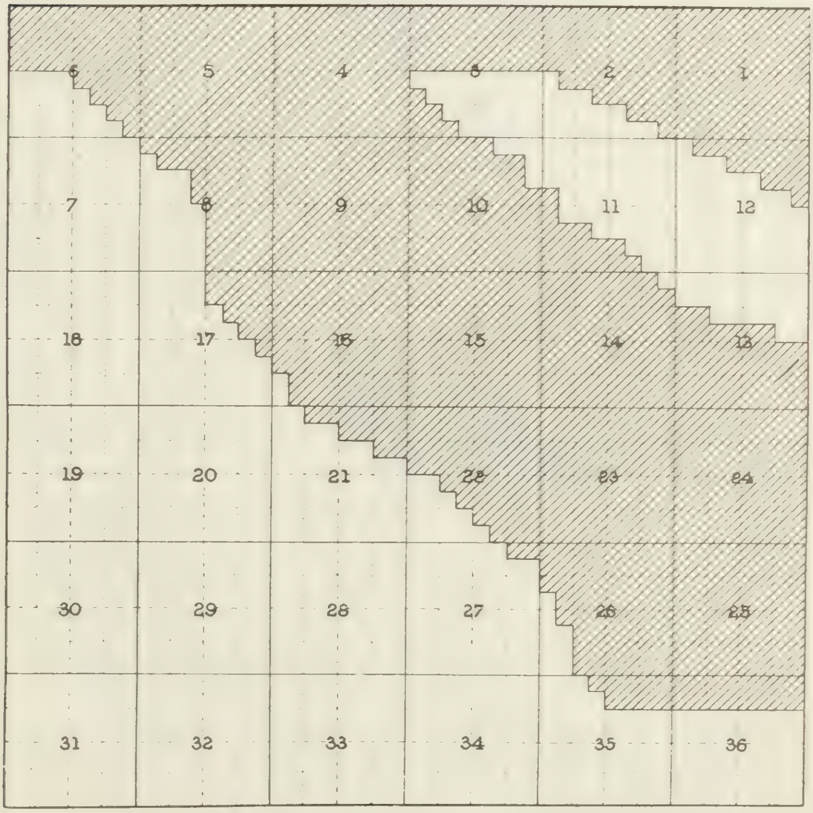


T.32S.R.22E.M.D.M. SAN LUIS OBISPO COUNTY.



T.32S.R.23E.,M.D.M. — KERN COUNTY.



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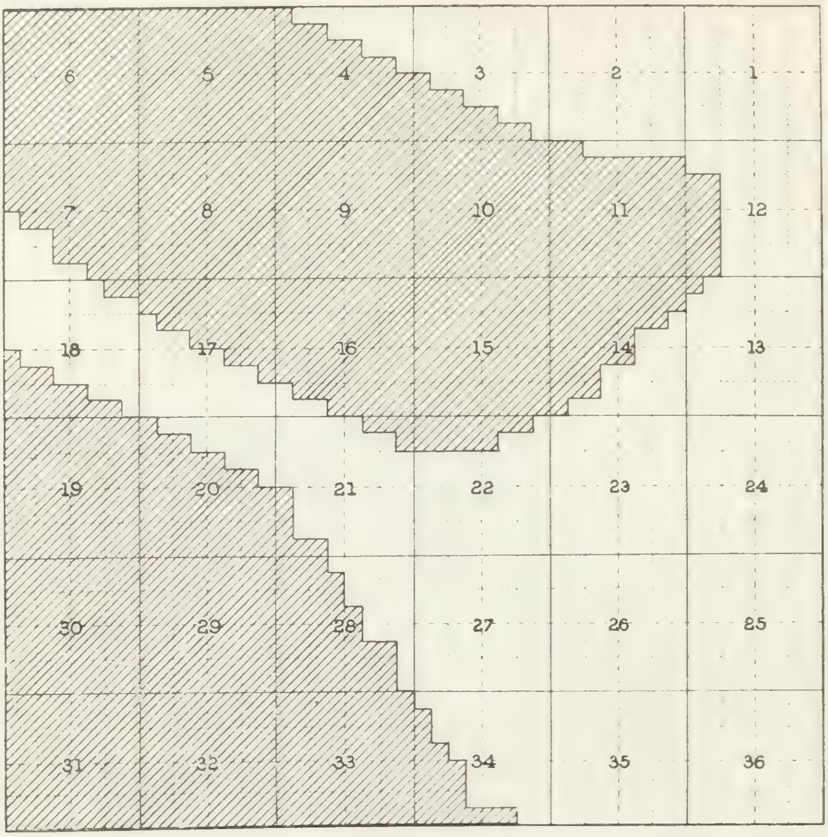
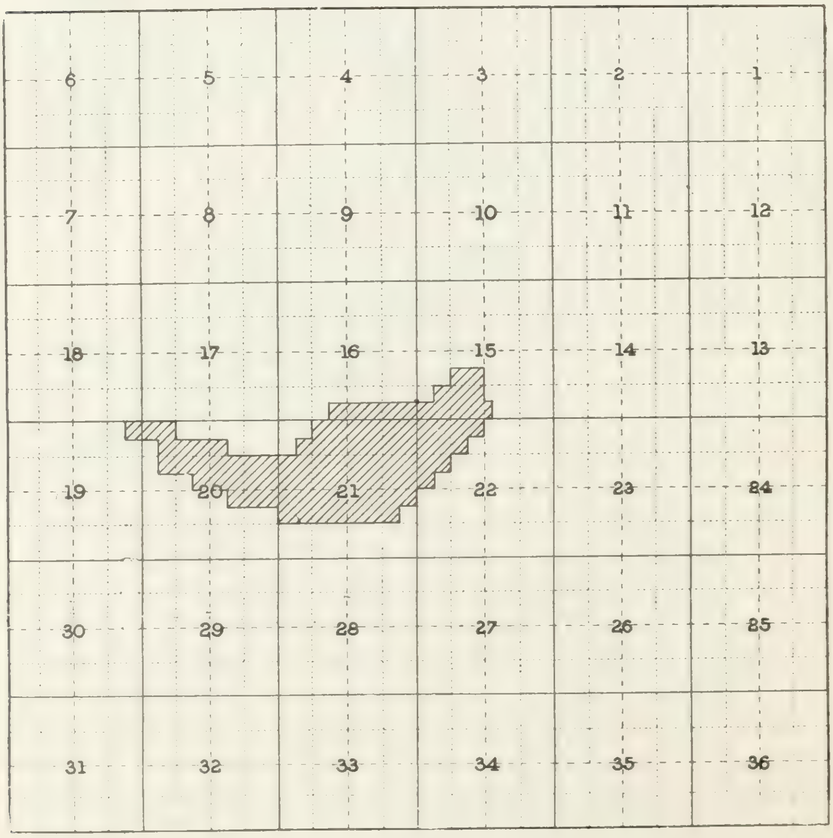
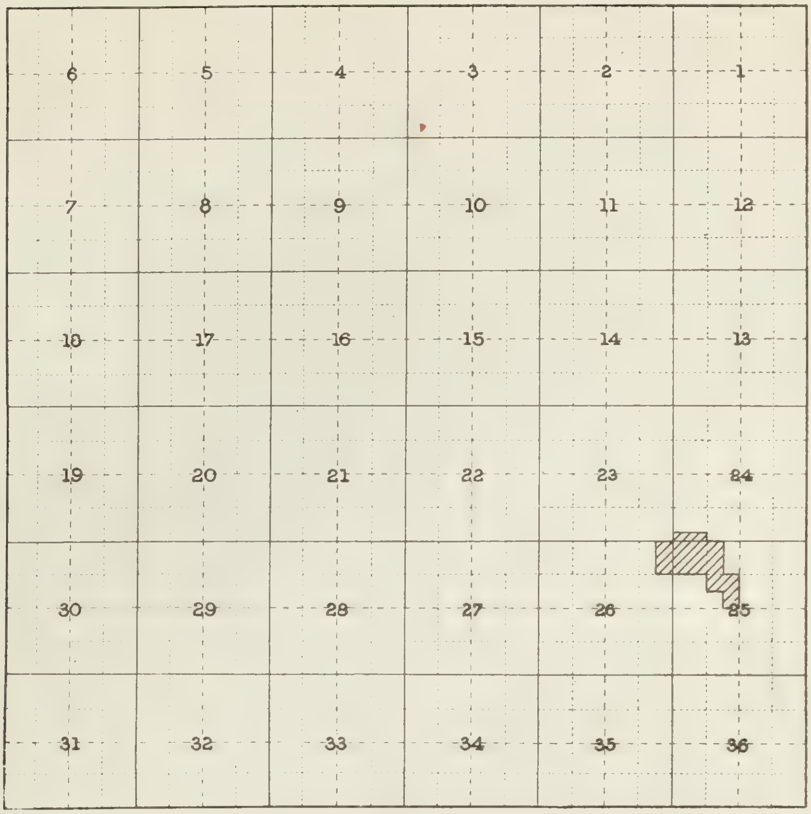


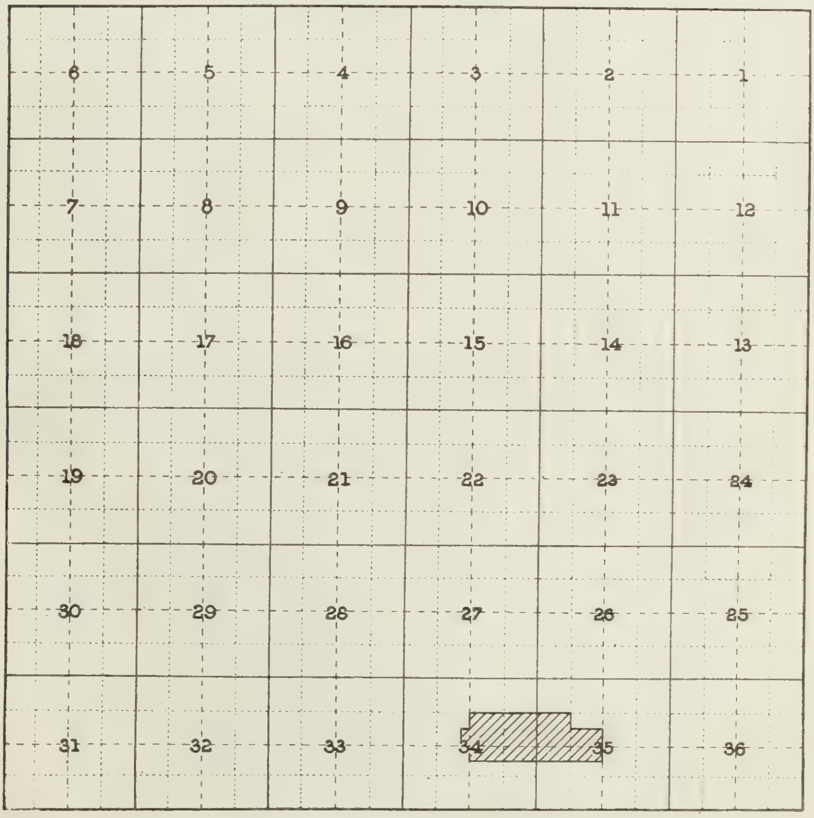
T. 1 S., R. 14 W., S.B.M. — LOS ANGELES COUNTY.



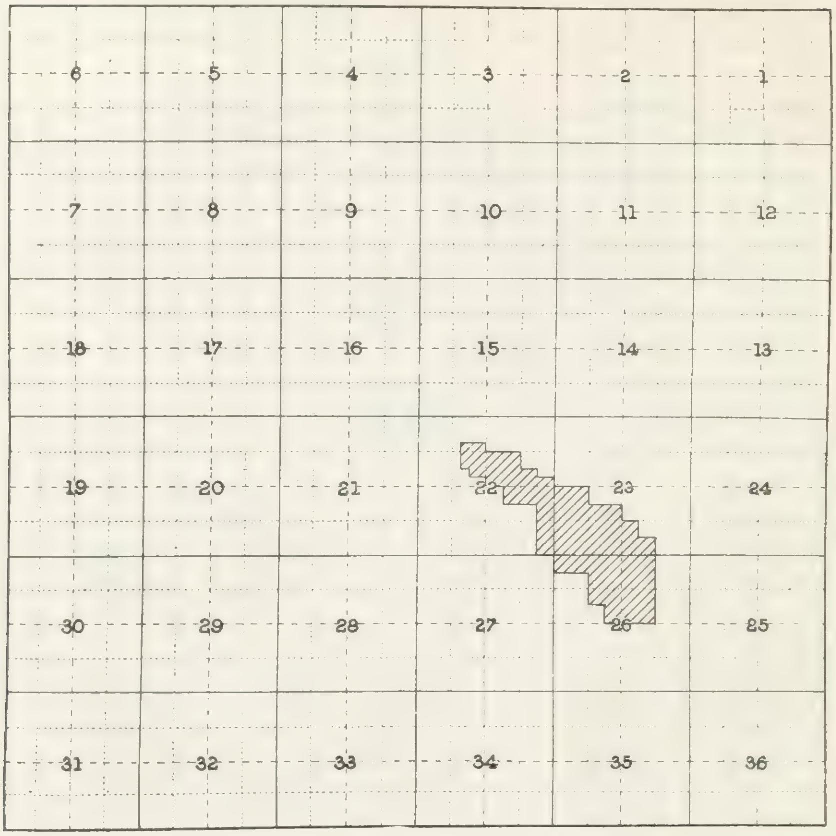
T. 1 S., R. 15 W., S. B. M. — LOS ANGELES COUNTY.



T. 2 S., R. 10 W., S. B. M. — LOS ANGELES COUNTY.



T. 2 S., R. 11 W., S.B.M. — LOS ANGELES COUNTY.



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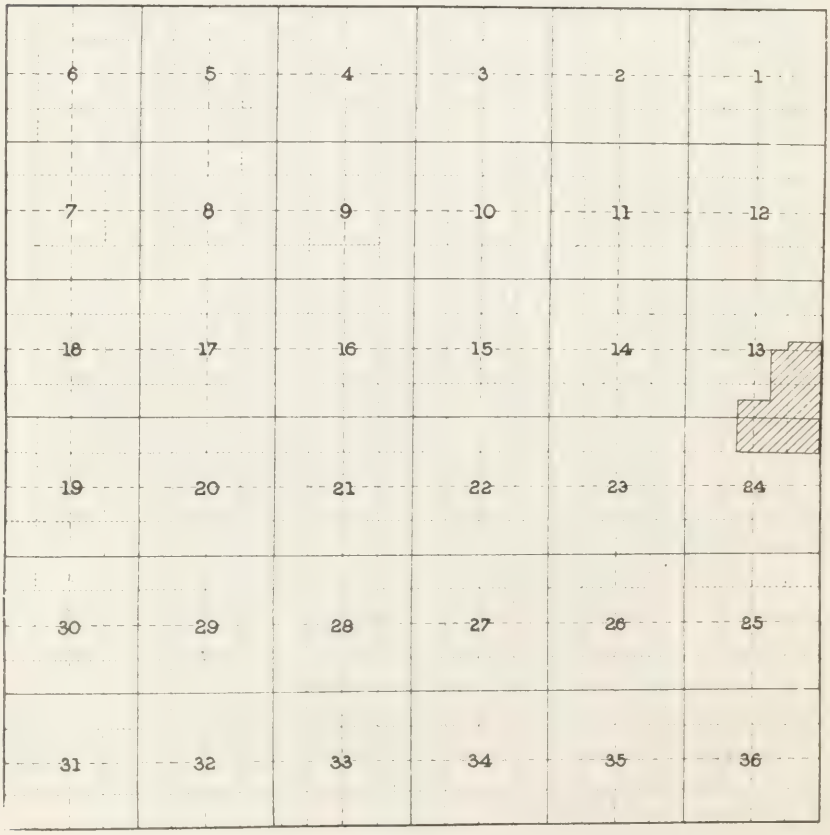

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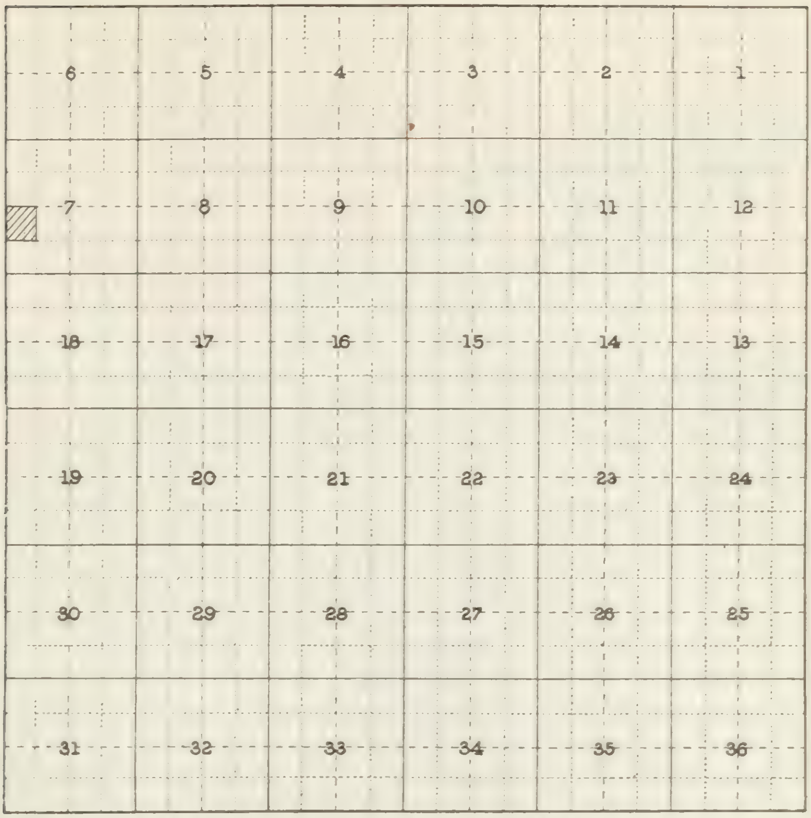

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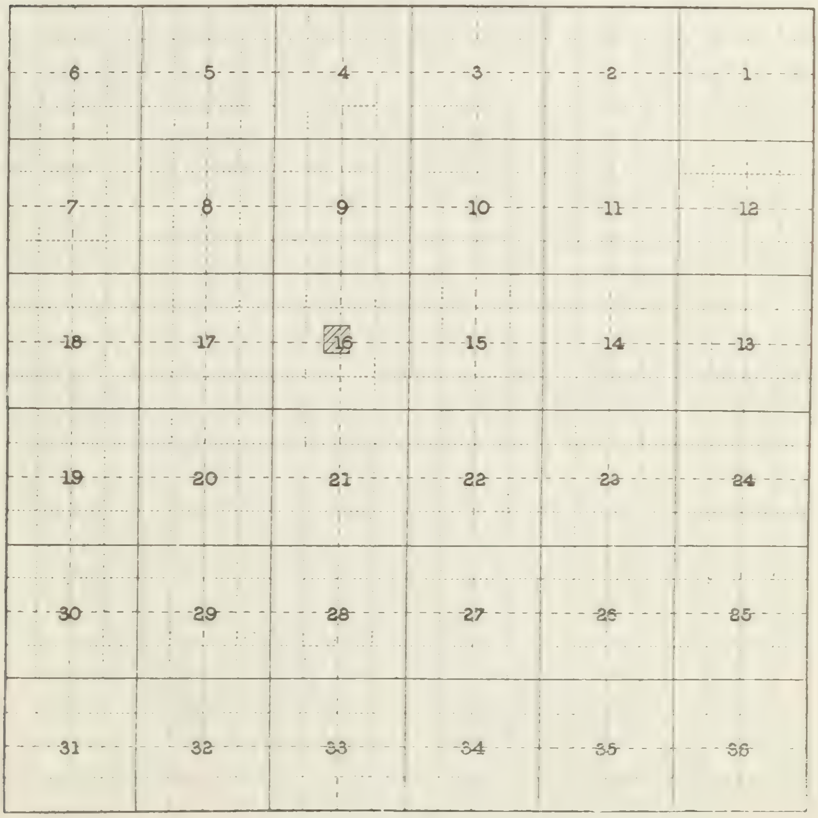
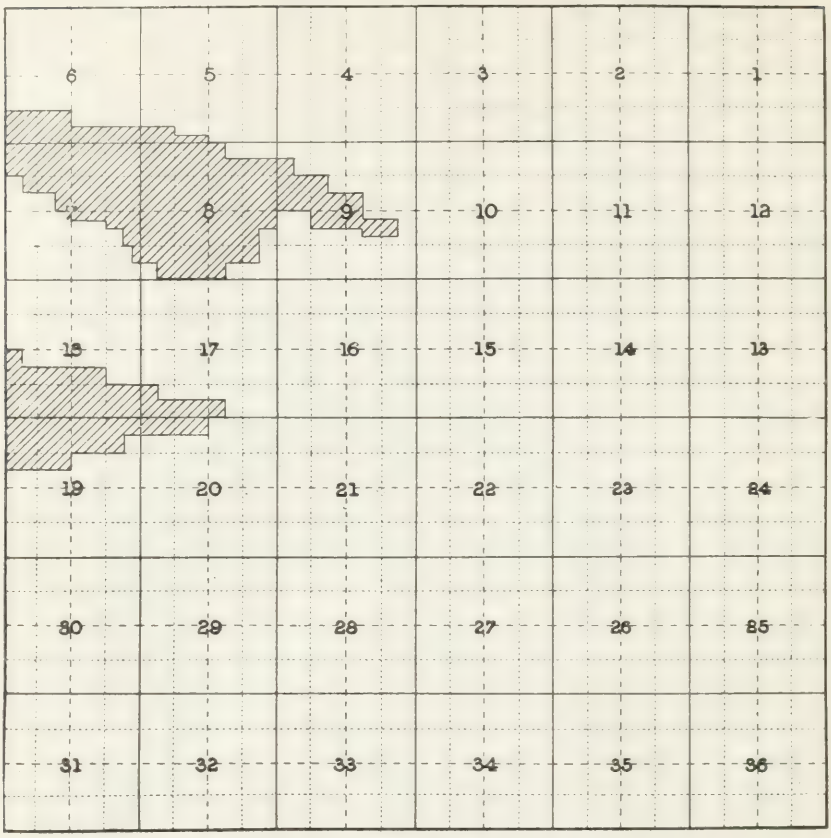
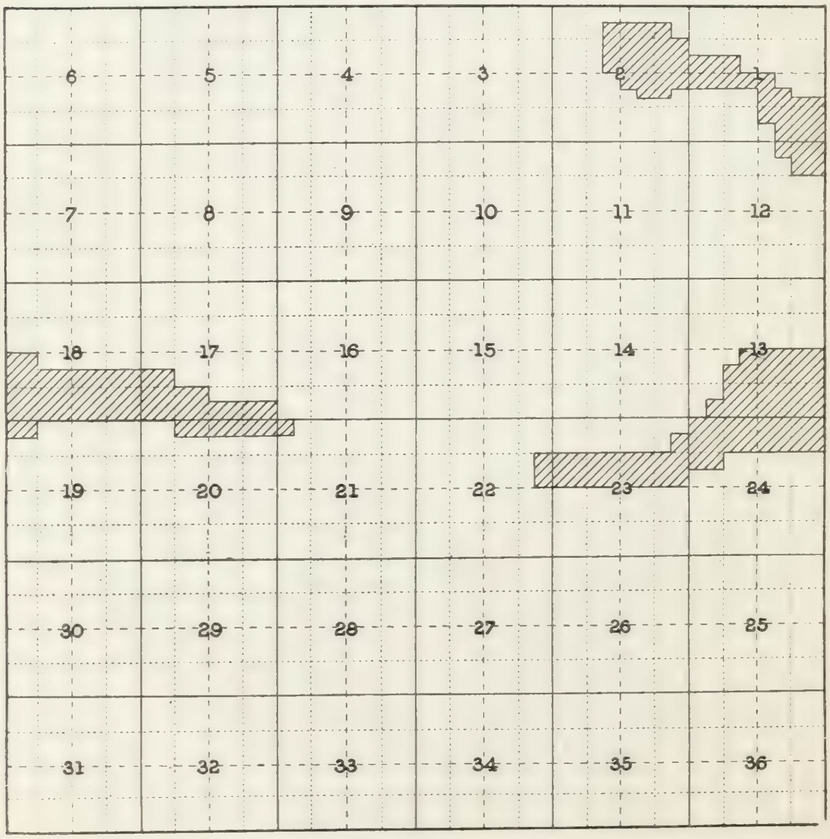


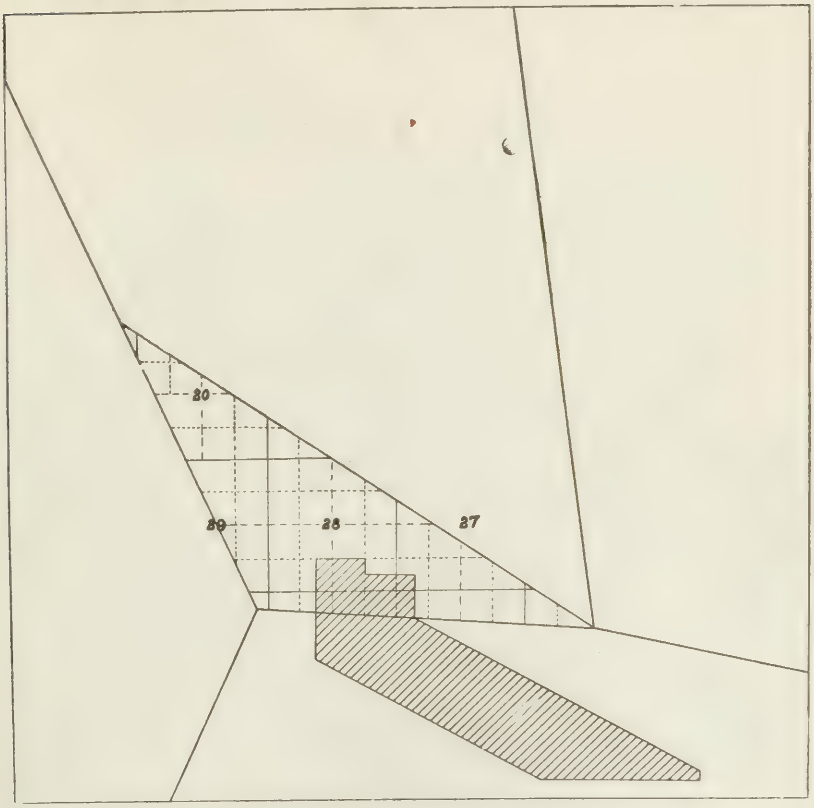
T. 3 S., R. 9 W., S.B.M. — ORANGE COUNTY.



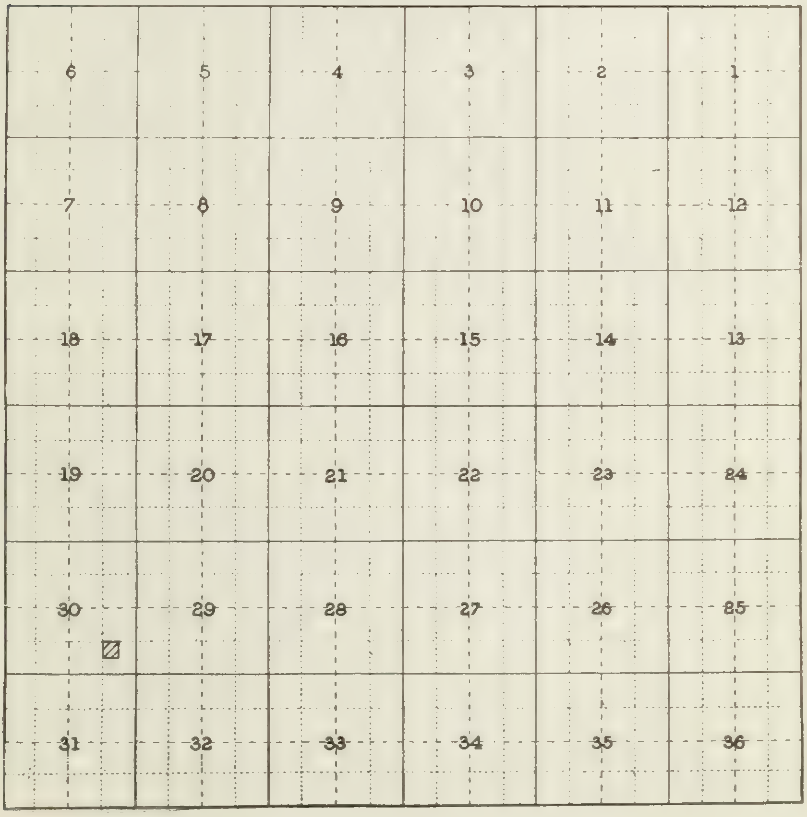
T. 3 S., R. 10 W., S.B.M. — ORANGE COUNTY.



T. 8 N., R. 34 W., S. B. M. – SANTA BARBARA COUNTY.



T. 9 N., R. 32 W., S. B. M. –SANTA BARBARA COUNTY.



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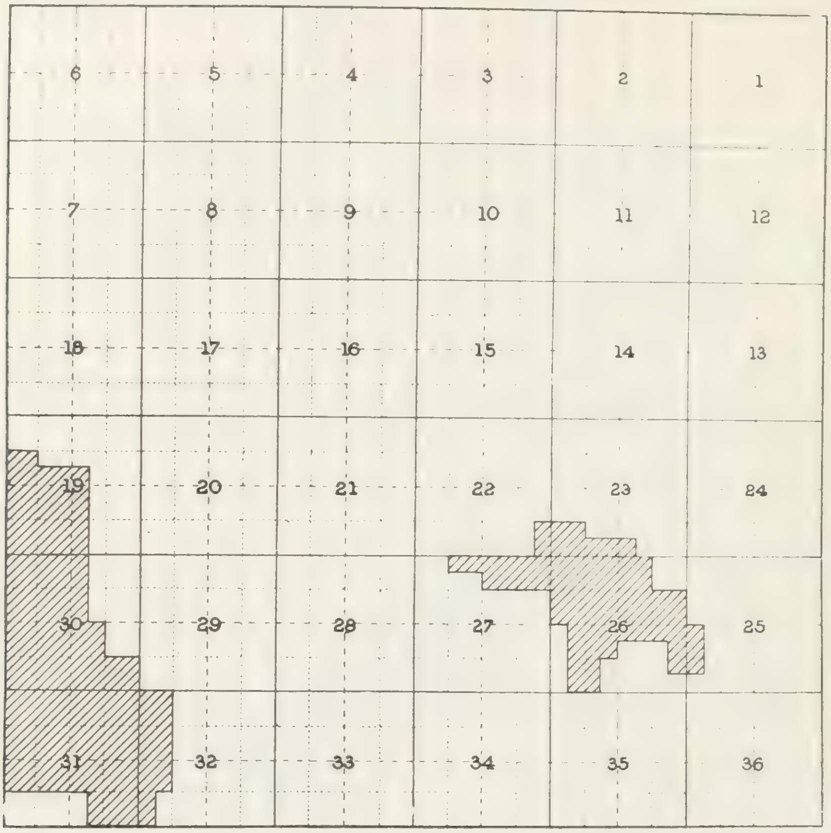

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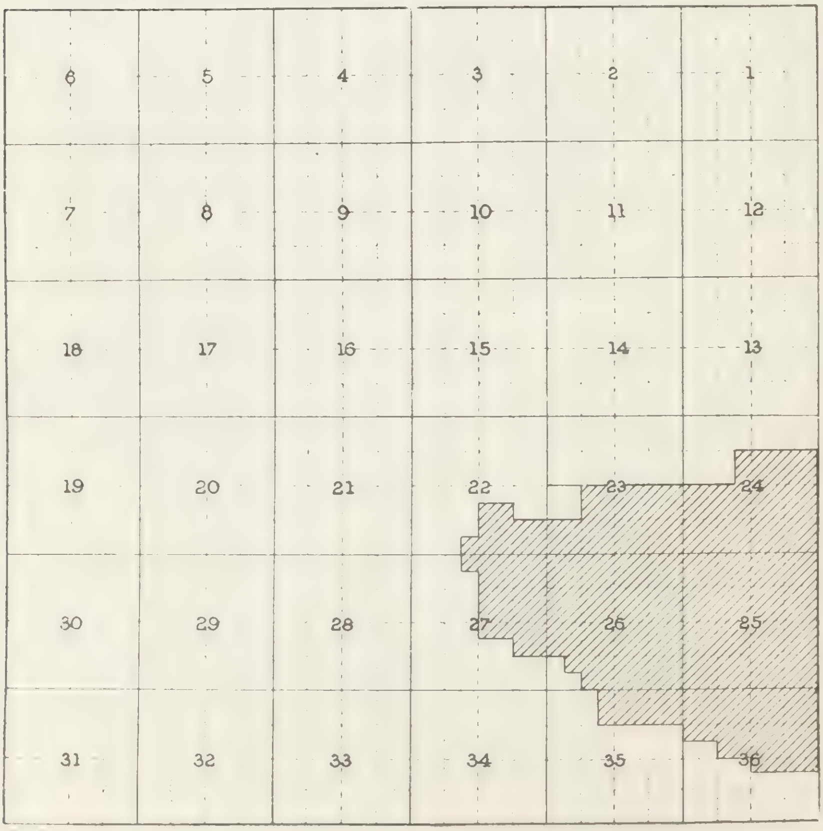
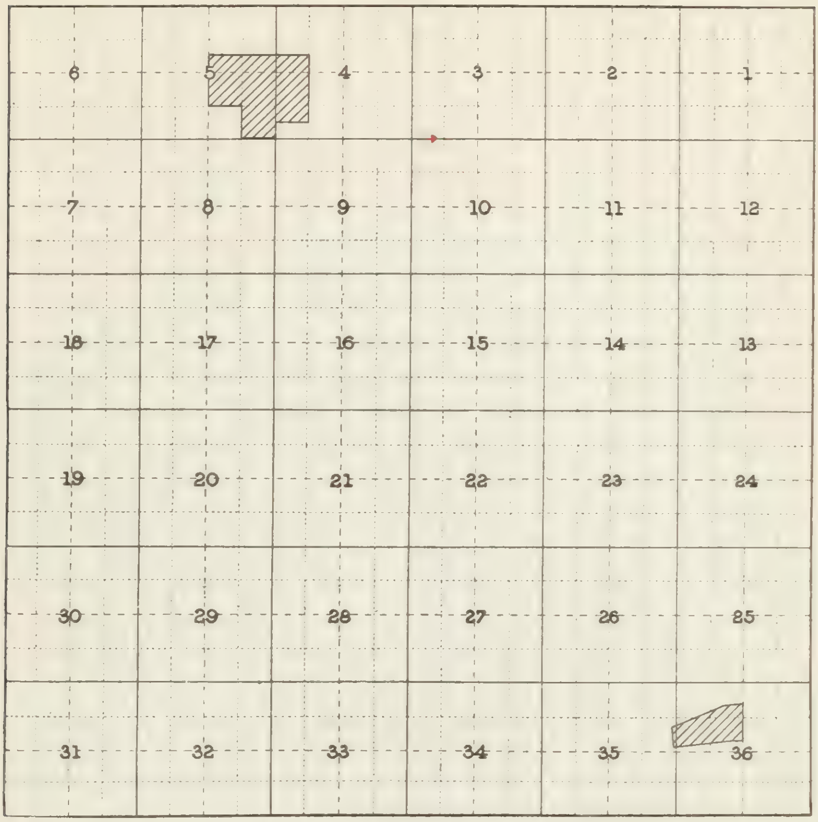


T. 3 N., R. 18 W., S. B. M. — VENTURA COUNTY.



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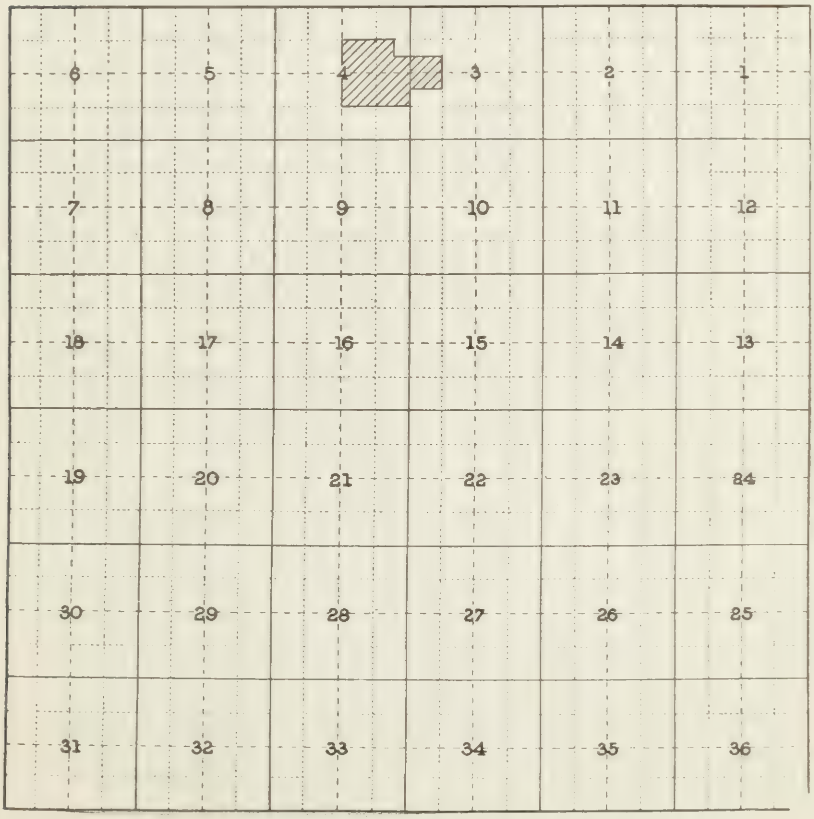

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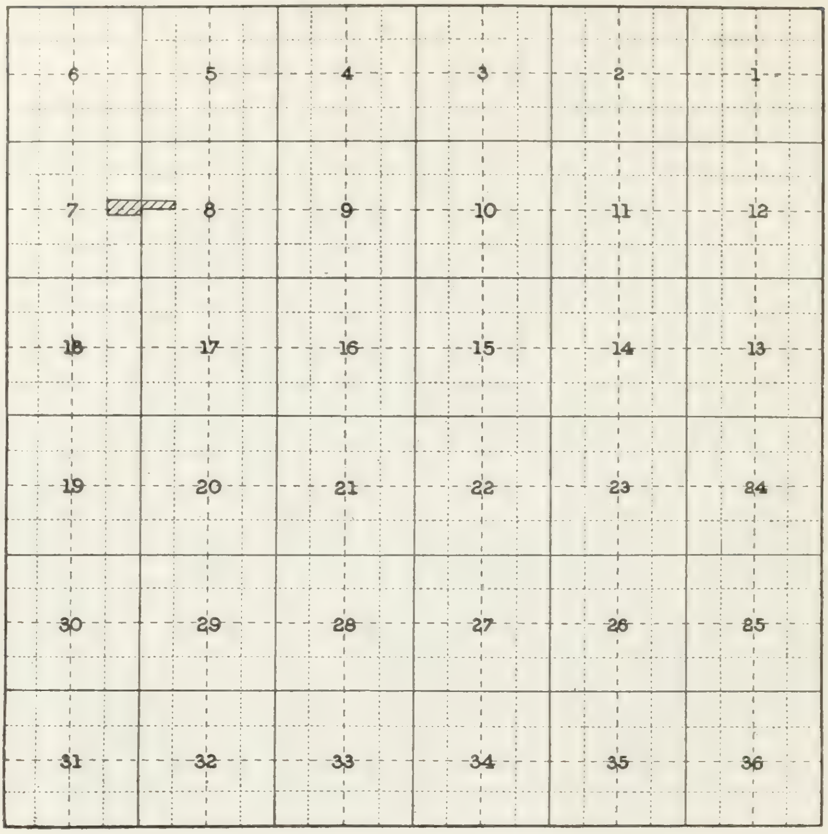

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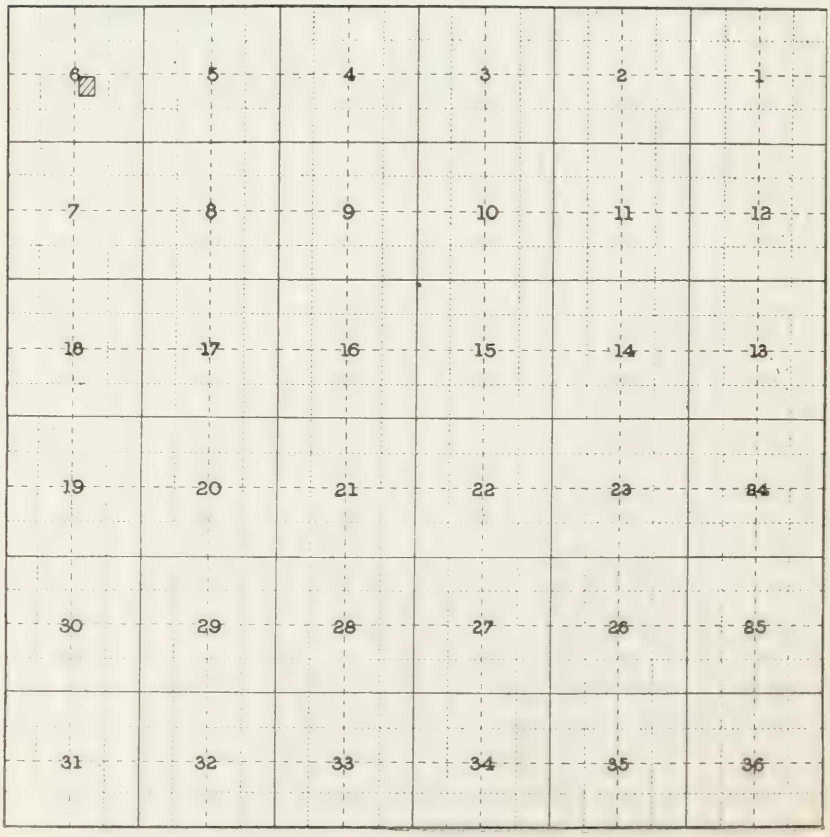

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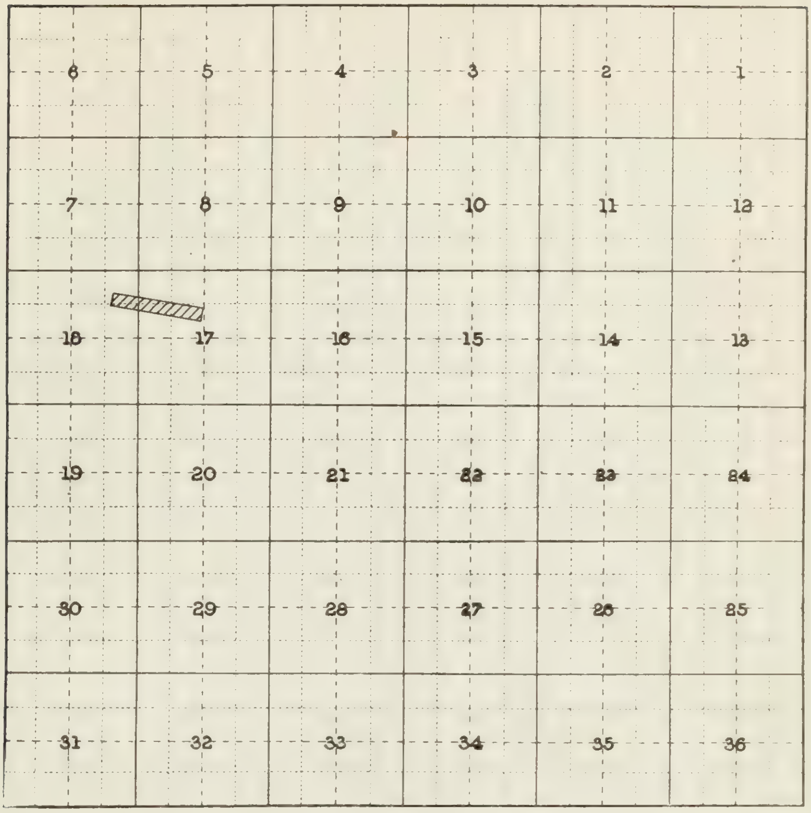

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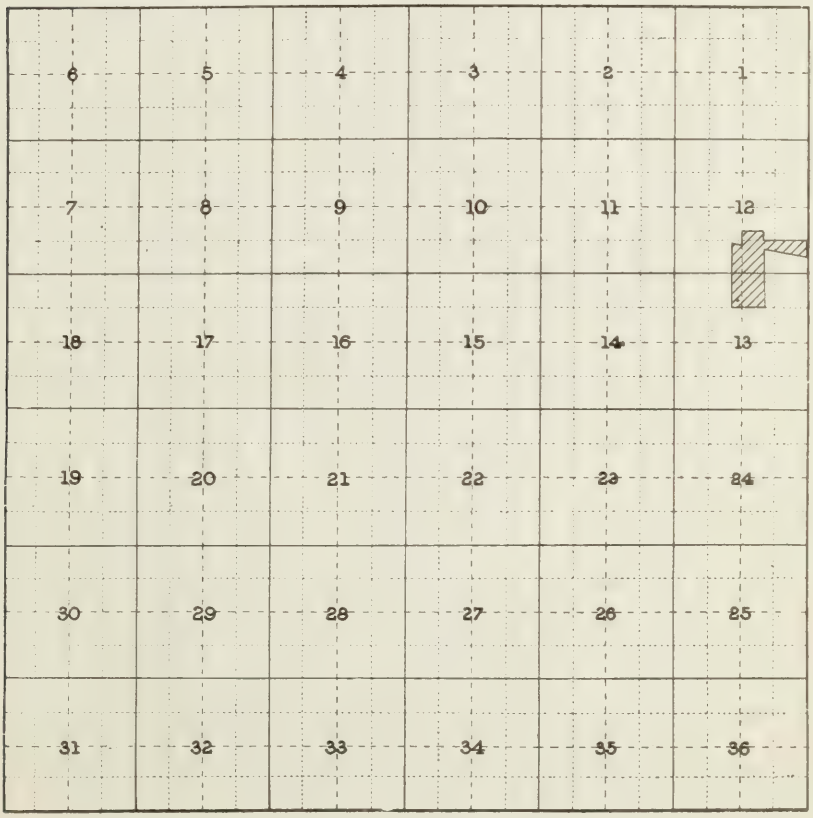
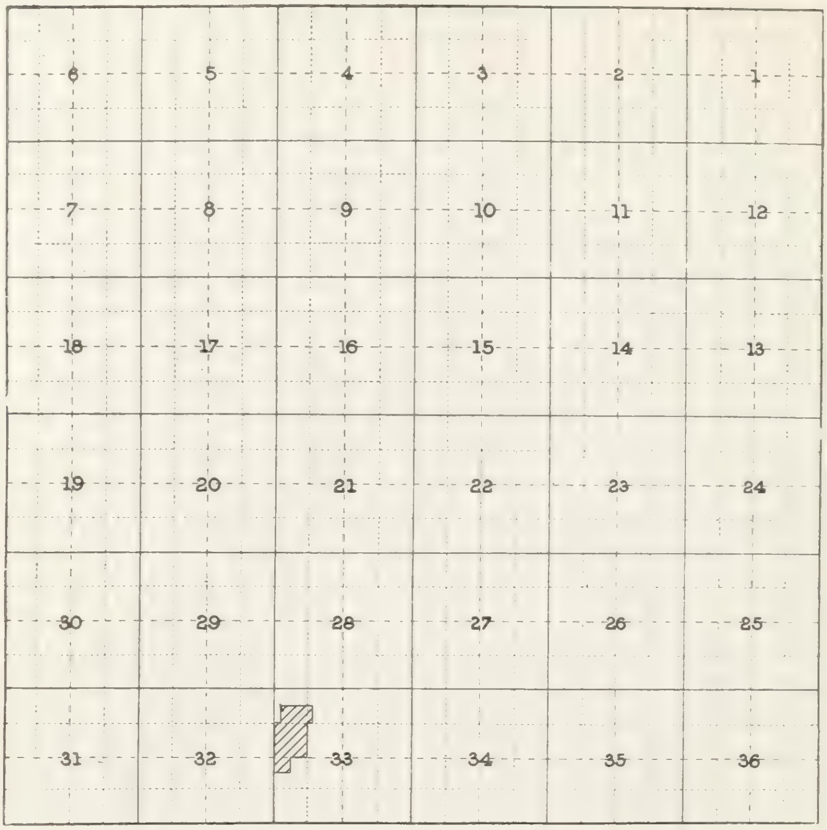


T. 5 N., R. 19 W., S. B. M. — VENTURA COUNTY.



CALIFORNIA STATE MINING BUREAU.

Statement of disbursements from "Oil Protection Fund" (Chapter 718, Statutes 1915), for the Department of Petroleum and Gas, for the period of August 9, 1915, to June 30, 1916:

Appropriation				$20,000 00
Disbursements			$19,438 64	
Office of headquarters		$6,327 87		
Salaries	$5,251 05			
Equipment	155 00			
Traveling expenses	735 34			
General expense	186 48			
Los Angeles office		3,092 67		
Salaries	$1,826 66			
Equipment	584 65			
General expense	681 36			
Coalinga office		2,946 33		
Salaries	$2,109 66			
Equipment	--------			
General expense	836 67			
Taft office		3,882 50		
Salaries	$2,200 00			
Equipment	616 79			
General expense	1,065 71			
Santa Maria office		3,189 27		
Salaries	$1,579 02			
Equipment	770 37			
General expense	839 88			
Unexpended balance			561 36	
			$20,000 00	$20,000 00

The above statement represents the total cost for supervision for the period as indicated above. No expenditures were made for repair, as no funds were available in the "County Repair Account," as provided in section 46, Chapter 718, Statutes 1915.

No statement is made of funds collected, as no assessments were due during the above period.

W. W. Thayer,
Secretary.

CHAPTER II.

COALINGA, LOST HILLS AND BELRIDGE FIELDS.

By M. J. KIRWAN, Deputy Supervisor.

Organization.

The Coalinga office of this department was established August 9, 1915, with the present deputy supervisor in charge. The office records of the Fresno County oil well commissioner were taken over and have been of considerable value to the department.

District.

The territory assigned to this office includes the Coalinga oil field in Fresno County, and the Lost Hills and Belridge oil fields in Kern County and intervening territory as far south as the center of T. 29. S., M. D. B. & M.

General statement.

The work of this department was not entirely new to the operators in the Coalinga District. Fresno County employed an oil well commissioner for several years whose duties were similar to those of the present deputy supervisor, the essential difference being that under the county plan no funds were available for repair of wells which were flooding the oil producing formations. Under the present law oil operators are afforded protection from menacing water wells in the oil fields. The first year's work of this department has been spent, to a large extent, in routine work and collection of oil well data. Most of the operators were very prompt in turning in the desired information, which included logs and well histories, also monthly production reports showing the amounts of oil and water, together with the gravity and number of days each well produced during the month. A few cases arose in which it was necessary to call the attention of certain operators to the fact that they had not complied with the law in sending in notices concerning work in progress in deepening or redrilling old wells. In a few other cases the information contained on the notices was of such a meager character that additional information was called for before a decision was rendered, and in some instances this necessitated delays for the operator. In this connection it may be stated that those operators who were most generous in the information turned in, were not delayed in their work by this department.

Several cases arose in which operators proposed to do certain work in abandoning wells and an investigation by the department showed that plugging or other work was not necessary as no oil sand of commercial value was encountered.

In addition to the written complaints, a number of informal complaints concerning water conditions were received. Some of the latter were handled by holding conferences with the operators involved and others by calling the attention of the owners to the affected wells. Desirable results were obtained in most cases, but in a few others results probably will not be forthcoming until an order has been issued by the state supervisor demanding that certain repair work be done. Some of the complaints resulted from a misunderstanding between neighboring companies, and on account of their having insufficient information concerning the neighboring property. This department has settled many such cases by an impartial presentation of the facts.

During the fiscal year 420 written decisions were made, among which were 148 for tests of water shut off, 82 for redrilling wells on account of water trouble, 76 for redrilling in order to increase production, 23 for abandonment, and 141 for new wells. The supervisor did not have occasion to reverse any of the foregoing decisions, although a number of the operators' proposals for certain work on wells were rejected. In these cases the deputy made recommendations covering the proper and necessary work on such wells. One of these recommendations in the Coalinga field caused an operator to shut off top water 100 ft. higher than proposed, with the result that a productive oil sand was found after drilling three feet ahead of the water string. This sand would have otherwise been passed through and lost.

In order to avoid future trouble it is necessary that operators shut off water at the proper depth in a well. It frequently happens that oil sands are commercially productive in certain areas and the same sands in other areas carry but little oil. Operators in the latter area may desire to shut off such sands to the detriment of his neighbor who may be producing from them. Other cases arise where it is easier for an operator to shut off top water in an old well by cementing in shale below the top oil sand and not take into account the neighbor who may be producing from this upper sand. In plugging off bottom water in some wells the operator may permit oil sands under the plug to be exposed to the water below.

The determination of the proper depth at which water should be shut off has been found to be among the most important phases of field work of this department.

The gathering and compilation of well records by the department has been beneficial to oil operators in a number of ways. While the preparation of the log records by the various companies has been more or less expensive, many of the companies found that as a result they have better and more complete data for themselves. In two cases the department was able to duplicate company log records which were destroyed by fire. In several cases records were furnished operators who came into possession of properties of which they had but little information concerning underground conditions.

It is surprising that a number of companies have but single copies of their data in buildings susceptible to destruction by fire.

Previous to the enactment of the present law only about 30 per cent of the operators under the supervision of this office kept monthly records showing the amounts of water and oil produced by each individual well. This information is of primal importance both to the operator and this department. To successfully manage a property an operator should know approximately, at least, the amount of oil produced by each well in order to determine if money is made or lost in its operation. There are cases where individual wells make large quantities of water and do not produce sufficient oil to pay for their operation. They are operated, however, to improve the general water conditions of the property. In most of the latter cases it would be more profitable to correct the trouble rather than produce the water. With the aid of monthly records the operator is enabled to keep close watch on the performance of each of his wells. The amount of water produced by some wells depends on the depth at which they are pumped.

Where tubing is placed at the top of the water level in a well and the oil which comes up through the water removed, the production report would not reveal the true water condition of the well.

Some of the companies in the Coalinga field are keeping fluid level reports. These reports show the depth to top of the fluid in the well. This information is usually obtained when the tubing has been pulled. One of the larger companies in this field makes considerable use of the fluid level data in detecting offending water wells. Where a group of wells all produce considerable water, the one with the highest fluid level, position of the well on the dip and the age of the well taken into account, should be among the first to be tested.

COALINGA.

East Side Field—Principal Formations.

Big Blue. In the East Side field the first stratum of importance encountered in the drilling of wells is a body of shale known as "Big Blue." The approximate maximum thickness of this stratum is 300 ft. Toward the southeastern portion of the East Side field interbedded layers of sand appear within the Big Blue. In the early days of drilling the Big Blue was used as the stratum of identification in correlating the oil and water sands and determining the proper points for water shut off. As the drilled area increased, however, it was found that a certain stratum within the Big Blue, known as the Red Rock, gave more accurate data for correlation, especially in the southeastern portion of the field.

Red Rock. The Red Rock is a shale composed of serpentine fragments, the iron content of the serpentine having been oxidized. In the northern portion of the field practically all of the Big Blue formation is red rock. In the southern portion of the field the red rock stratum is much thinner. The thickness of the red rock stratum here varies from two to ten feet.

Principal Oil Sands.

The horizon of productive oil sands lies below the red rock. In the west central portion of the field the oil formations are approximately 800′ thick. In the southern portion of the field the upper beds, which should be the stratigraphic equivalent of those in the west central portion, have not been tested for production because of the presence of an interlying water sand approximately 350′ below the red rock. The formations between this interlying water and the red rock probably could be tested in a new well without much additional expense over the cost of present wells in this area.

Brown Shale. Underneath the oil horizon is a body of brown shale. The thickness of the brown shale, as shown by four wells drilled through it, varies from 665′ to 880′. In general, on the east side, wells are drilled into brown shale unless interrupted by bottom water sands.

Infiltration of Water.

Top Water. With a few isolated exceptions, top water trouble on the east side is confined to certain wells within the bounds of Section 22–19–15. In many of the wells drilled in the north half of Section 22, cement was not used to shut off top water. The records of the wells show that the depths of water shut off were not uniform. The top water never has been shut off in a number of wells in this section. These wells are undoubtedly contributing to the water troubles of this area.

Bottom Water. There are six well defined localities in the east side where bottom water has been encountered. From the abruptness with which water indications disappear on the borders of some of these localities and the fact that sands of the oil horizon, except in the north end, can not be correlated through any great distance, it appears that the bottom water must lie, as do the oil sands, in lens-shaped formations. The water formations occupy varying positions with respect to red rock and brown shale in the different localities.

In the producing area in the northeast quarter of Section 11–20–15, and the northwest quarter of Section 12–20–15, bottom water has been encountered at depths varying from 600′ in the western to 660′ in the eastern portion below red rock. None of the affected wells are drilled into the brown shale in this area. Operators in this area should exercise great care in order not to drill into this bottom water. Under certain conditions it would be necessary to seal off an oil sand just above the bottom water in order to find suitable formation for shut off. One of the wells in this area was drilled through this water sand; cemented it off, and entered an oil sand which produced an average of 1,000 bbls. of clean oil for three days. At the end of this time water appeared in the well and it is now being redrilled.

The depth of the water shut off below red rock in this area varies from 370′ to 430′. There are two wells drilled below the water in which it is questionable whether plugging gave sufficient protection to lower oil sands.

EAST SIDE FIELD.

The second area under consideration includes wells within a radius of a little over one-half mile south and east of the northwest corner of Section 2–20–15, and one well on Section 35–19–15. There are 14 wells in this area which were drilled into bottom water. Six of these wells were drilled into the brown shale. In some of the wells in this area it is difficult to determine just which one of the lower sands carries water. The bottom water stratum has been located definitely in three wells. This bottom water probably lies in a sand lens. W. K. well No. 3 was drilled to brown shale and no bottom water was encountered. In the area within a radius of two miles north and west of the northwest corner of Section 2–20–15 none of the many wells drilled into the brown shale, encountered bottom water.

In the area within a radius of one-half mile of the northeast corner of Section 35–19–15 nine wells have been drilled. Six of these wells were drilled into the brown shale. Four of these wells encountered bottom water and plugged it off. In one well the bottom water sand is 778′ below the red rock and is the third sand above the brown shale. One of the wells in this area was drilled into bottom water and later plugged and abandoned.

In the area comprising a group of nine wells near the southwest corner of Section 28–19–15, four wells encountered bottom water. Two of these wells were drilled into the brown shale. The bottom water sand in this area is immediately over the brown shale. Bottom water was plugged off in all of these wells.

Most of the wells in the west half of Section 22–19–15 were drilled to the brown shale. With the exception of a few wells along the north and south center line of the section no bottom water was encountered. All wells which were drilled to brown shale in the eastern portion of Section 22–19–15 encountered bottom water, excepting one well on the south line. A number of wells encountered bottom water without entering the brown shale.

This bottom water has contributed largely to the water troubles existing in this area. Bottom water in a number of cases has been effectively plugged off. Some of the early wells drilled here were abandoned without properly protecting the oil sands.

The Record Oil Company is now deepening well No. 12 with the intention of shutting off below this water. The object is to test formations above the brown shale. These tests should be of value in determining the relative positions of water and oil sands. Also this work should do much toward substantiating the records of other wells which entered and successfully plugged off bottom water. It is expected that the results of the deepening of this well will open a way to remedy for much of the water trouble in this area.

In the area northeast of Section 22–19–15 there are several scattered wells affected by bottom water. With the exception of two wells this water has been plugged off. The other two wells are being redrilled to shut off the water.

LIST OF RECORDS.

Production Reports.

Monthly production reports are received from every producing company in the Coalinga, Lost Hills and Belridge districts. Some of these reports are more or less incomplete in the data they convey. Other reports show a lazy repetition of the same figures from month to month for a given well. Aside from the few cases, however, of the above character the reports are of a satisfactory nature.

Logs of Wells.

The following list shows the number of logs, due from oil companies, which have been received in this office. It also shows that there are a number of companies which have not furnished this department with any logs.

Log Summary.

Field	Number of logs required	Number of logs received	Number of logs not received
Coalinga	1,339	1,102	237
Lost Hills	261	247	14
Belridge	152	145	7

COALINGA FIELD. T. 20, R. 15. LOG RECORD.

Section	Company	Number of logs required	Number of logs received	Number of logs not received	Remarks
1	Penn Coalinga	10	10	0	
	Amity	8	7	1	
	Zier	19	18	1	
2	Acorn	1	0	1	
12	Homestead Development	12	12	0	
	Spinks Crude	7	7	0	
	Coalinga Unity	4	1	3	
	Pilot	6	6	0	
	British Consolidated	11	0	11	
	Ward	8	0	8	
	Seneca	6	0	6	
	Shawmut	8	0	8	
13	K. T. & O.	23	23	0	
	Union	19	18	1	
14	Coalinga Income	2	0	2	
	Coalinga Petroleum	8	8	0	
	Queen	3	0	3	
	Arizona Petroleum	7	7	0	
	Strong	7	0	7	
	Ophir	2	0	2	
23	K. T. & O.	3	3	0	
	St. Paul Consolidated	18	18	0	
24	Inca	37	37	0	
	Traders	27	27	0	
	Premier	16	16	0	
	Claremont	13	13	0	
	Salvia	21	21	0	
	Wrenn & McQuigg	2	0	2	
25	K. T. & O.	35	35	0	
26	Coalinga Homestake	7	7	0	
	Hawkeye	4	0	4	
	Shandon	4	0	4	
	Traders	3	3	0	
	Ozark	6	0	6	
	Coalinga Crude	1	0	1	
35	Circle	1	0	1	
	Traders	4	0	4	
36	Associated	39	39	0	
	Totals	412	336	76	

COALINGA FIELD. T. 19, R. 15. LOG RECORD.

Section	Company	Number of logs required	Number of logs received	Number of logs not received	Remarks
2	General Petroleum	8	8	0	
	Shell Company	1	0	1	
	Imperial	1	1	0	
3	K. T. & O.	2	2	0	
10	Shell Company	10	10	0	
	Coalinga Midland	1	0	1	
11	K. T. & O.	18	18	0	
12	Lorene	1	0	1	
	British Consolidated	2	0	2	
14	Shell Company	20	20	0	
15	Shell Company	1	1	0	
17	Western States	3	1	2	
20	Standard	18	9	9	
21	Shell Company	10	10	0	
22	Record	13	13	0	
	Caribou	26	23	3	Old 11, 18, 19, lost.
	Sauer Dough	10	10	0	
	Associated National-30	10	10	0	
	Coalinga Peerless	20	20	0	Blue print logs.
	Good Luck Oil Company	6	0	6	
	Shell (Merced)	5	5	0	Logs incomplete.
	Shell (Camwell)	6	6	0	Logs incomplete.
	Shell (Twenty-two)	2	0	2	
	Camwell	3	3	0	
26	Shell Company	19	19	0	
	Coalinga Metropolis	1	1	0	
27	Shell Company	78	78	0	
28	Standard	96	52	44	(Large number of wells drilled by former owners. No record.)
29	Shell Company	5	5	0	
30	Ætna Petroleum	1	0	1	
	Coalinga Crown	1	0	1	
31	K. T. & O.	9	9	0	
	Commercial Petroleum	16	16	0	
	W. M. & M.	8	8	0	
	Confidence	15	15	0	
	Aztec	3	3	0	
	Main State and Guthrie	15	15	0	
32	American Petroleum	5	5	0	
	Pantheon	2	2	0	
	Call	3	3	0	
	Coalinga Empire	4	0	4	
33	K. T. & O.	2	2	0	
34	Shell Company	31	31	0	
35	K. T. & O.	15	15	0	
36	Standard	5	5	0	
	Shell Company	1	1	0	
	Totals	532	455	77	

COALINGA FIELD. T. 20, R. 15. LOG RECORD.

Section	Company	Number of logs required	Number of logs received	Number of logs not received	Remarks
1	K. T. & O.	3	3	0	
2	Shell Company	30	30	0	
3	K. T. & O.	5	5	0	
4	Union	4	4	0	
	Castle	1	0	1	
6	American Petroleum	29	29	0	
	General Petroleum	14	14	0	
	New S. F. Crude	8	8	0	
	York Coalinga	6	6	0	
	Mercantile Crude	5	0	5	
	S. W. & B.	6	0	6	
7	Section 7	6	6	0	
	Coalinga Pacific	7	7	0	
	Arica	12	1	11	
	K. T. & O.	15	15	0	
8	Coalinga 8	3	3	0	
	Coalinga National	1	1	0	
	Coalinga Security	1	0	1	
	M. K. & T.	2	0	2	
11	K. T. & O.	1	1	0	
12	Coalinga Mohawk	6	6	0	
	Wilcox & Fleischacker	1	0	1	
14	Vancouver Coalinga	1	0	1	
17	Oil Exploration	2	2	0	
18	American Petroleum	27	27	0	
	Nevada Petroleum	13	13	0	
	Lakeport Petroleum	1	0	1	
19	Oil Exploration	3	3	0	
	American Petroleum	14	14	0	
	K. T. & O.	23	23	0	
20	Nevada Petroleum	1	1	0	
30	American Petroleum	30	30	0	
	Nevada Petroleum	18	18	0	
	Creme Petroleum	2	2	0	
31	K. T. & O.	16	16	0	
	Coalinga Syndicate	2	2	0	
32	Valley	1	0	1	
	Totals	320	290	30	

COALINGA FIELD. T 21, R. 15. LOG RECORD.

Section	Company	Number of logs required	Number of logs received	Number of logs not received	Remarks
6	California Oil and Gas	3	3	0	
	Jefferson	2	0	2	
	Section 6	1	0	1	
	Los Angeles Coalinga	1	0	1	
	Coalinga Red Top	1	0	1	
	Coalinga Alladin	1	0	1	
	Lucile	4	4	0	
	De Luxe	2	0	2	
	Amy	1	1	0	
	Silver Tip	2	2	0	
	Shreeves	2	0	2	
	Muriel	1	0	1	
	Marian	1	0	1	
	Six Acre	1	0	1	
	Pacific States	1	0	1	
	Blue Moon	2	0	2	
7	K. T. & O.	1	1	0	
8	Associated	1	1	0	
	Canadian Coalinga	1	1	0	
18	Boychester	1	0	1	
	Consolidated	1	0	1	
	Best Yet	1	1	0	
14	Blair	2	0	2	
22	Coalinga Hub	1	1	0	
26	Azores	1	0	1	
	Bohemian	1	0	1	
30	Esperanza Land and Oil	1	0	1	
32	Peoples Associated	1	0	1	
	Totals	39	15	24	

COALINGA FIELD. T. 21, R. 14. LOG RECORD.

Section	Company	Number of logs required	Number of logs received	Number of logs not received	Remarks
2	White Creek Coalinga	4	0	4	
	Spokane Coalinga	6	0	6	
	Berkeley Coalinga	5	0	5	
	Washington Coalinga	4	0	4	
	Henry Greve	1	0	1	
	Phelps & Cheney	1	0	1	
12	Hydraulic Drilling Company	5	5	0	
	Fifty-seven	1	0	1	
	Santa Rosa	1	0	1	
	Commercial Petroleum	2	0	2	
13	Esperanza Land and Oil Company	1	0	1	
	Totals	31	5	26	

COALINGA FIELD. T. 18, R. 14. LOG RECORD.

Miscellaneous.

Section	Company	Number of logs required	Number of logs received	Number of logs not received	Remarks
28	Peerless Consolidated	1	0	1	
	T. 18, R. 15.				
27	Standard	1	1	0	
34	Tavern	1	0	1	
	T. 20, R. 16.				
6	Phoenix Investment	1	0	1	
18	Southeastern	1	0	1	
	Totals	5	1	4	

LOST HILLS FIELD. LOG RECORD.

Township	Range	Section	Company	Number of logs required	Number of logs received	Number of logs not received	Remarks
26	20	3	Associated	1	1	0	
			B. B. & E. R. Dudley Pet. Co.	1	1	0	
		12	Baker & Henshaw	2	2	0	
		13	B. B. & E. R. Dudley Pet. Co.	5	5	0	
			Associated	28	28	0	
			Lost Hills Development	6	4	2	Blue print logs.
		14	Associated	1	1	0	
		24	California Star	4	4	0	Not on our forms.
26	21	18	Universal	2	2	0	
		19	Lost Hills Development	14	14	0	
		20	Universal	2	2	0	
		29	Associated	8	8	0	
		30	Devil's Den Consolidated	12	12	0	
			Universal	11	11	0	
		32	Universal	39	39	0	
		33	Associated	2	2	0	
27	21	3	Standard	1	0	1	
		4	Standard	40	32	8	
			General Petroleum	38	38	0	
		5	B. B. & E. R. Dudley Pet. Co.	5	5	0	
			Standard (Vulcan)	10	10	0	
			General Petroleum	4	4	0	
			Natoma	2	2	0	
			Universal	8	8	0	
		7	Lindsay Oil Company	1	0	1	
		9	Standard	12	11	1	
			B. B. & E. R. Dudley Pet. Co.	1	0	1	
		17	Associated	1	1	0	
			Totals	261	247	14	

BELRIDGE FIELD. LOG RECORD.

Township	Range	Section	Company	Number of logs required	Number of logs received	Number of logs not received	Remarks
27	20	22	Associated	1	1	0	
		27	Associated	1	1	0	
		34	Reward	1	0	1	
		35	Belridge	9	3	6	
28	21	20	Belridge	1	1	0	
		28	Belridge	7	7	0	
		29	Belridge	14	14	0	
		32	Belridge	32	32	0	
		33	Belridge	40	40	0	
		34	Belridge	14	14	0	
29	21	2	General Petroleum	5	5	0	
		3	General Petroleum	26	26	0	
		11	General Petroleum	1	1	0	
			Totals	152	145	7	

Maps.

The following maps and drawings are on file in this office:

One map of underground contours of top of producing oil sand in southwestern part of Coalinga Field; scale 600′ to 1″ (include Section 25; Section 36–20–14; Section 30 and 31–20–15; Section 5, 6, 7, and 8–21–15).

One topographic map of the Coalinga District, scale 1″ to 2000′, contour interval 20′.

Five maps of Coalinga District, data compiled or gathered from different sources.

List of elevations of wells in Coalinga District.

Numerous small maps and drawings showing property lines and well locations.

Five maps of Universal Oil Company properties in Lost Hills.

Thirteen maps showing locations and elevations of all wells on properties of the Shell Company of California.

One map of the Belridge Oil Field.

Two maps showing well locations of Belridge and Lost Hills properties of the General Petroleum Company.

One map showing the well locations of California Star Oil Company property in Lost Hills.

Two maps showing well locations on Lost Hills property of the Lost Hills Development Company.

Cross Sections.

A number of cross-sectional drawings showing fluid levels in wells.

A number of drawings showing graphic water curves for certain wells.

There are 119 well cross sections, on tracing cloth, on file in this office. One of these sections shows a line of 51 wells.

There are also on file 350 blue prints graphic well logs.

Correspondence, Etc.

There is a complete segregated file in this office for all correspondence, official notices and decisions.

Peg Models.

The following peg models are set up in this office:

Complete peg model of Section 6–21–15, scale 100′ to 1″. Thanks are due to Mr. L. L. Richard of the California Oil and Gas Company for assistance in preparation of this model. This model also includes a number of wells in sections bounding Section 6–21–15.
portion of Section 27–19–15, and 35–19–15.

Peg model of 11 wells around the common corner of 28, 29 and 33–19–15. Scale 100′ to 1″.

Peg model of east half of Section 6–20–15 and south line wells of Section 31–19–15. Scale 100′ to 1″.

Peg model of a large part of Lost Hills Field which includes Sections 12, 13 and 24 on 26–20, and Sections 18 and 19 on 26–21. Scale 100′ to 1″.

Thanks are due to various operating companies in Coalinga, Lost Hills and Belridge districts, who have presented to this office maps and other drawings showing property lines, locations of wells, elevations, etc.

COMPLAINTS.

Complaint No. 1.

Creme Petroleum Company. Well No. 1.

On September 13, 1915, the American Petroleum Company entered a written complaint with this department against well No. 1 of the Creme Petroleum Company on Section 30–20–15. It is supposed that this well is making top water and contributing to water troubles of wells in its immediate neighborhood.

The American Petroleum Company proposed that the State Mining Bureau enter into a written agreement whereby the American Petroleum Company and Nevada Petroleum Company should furnish sufficient money to repair this well, as there was no funds at the disposal of the State Mining Bureau for repair purposes at this time, with the understanding that such money be returned to them from the repair fund which would be available at the beginning of the fiscal year, July 1, 1916.

A number of legal complications arose which made this proposal untenable.

Under date of December 3, 1915, the Nevada Petroleum Company entered written complaint against the Creme Petroleum Company well No. 1 stating that it appears that it is the duty of this department to take charge of Creme Petroleum Company No. 1 well and endeavor to protect surrounding properties from the encroachment of water originating in this well.

As has been stated there was no repair fund available at the time of these complaints against the Creme Petroleum Company well No. 1, consequently nothing has been done in the matter.

I recommend that steps be taken by this department to investigate and possibly repair this well, as the first operation in clearing up the water situation in this neighborhood.

Complaint No. 2.

Kern Trading and Oil Company. Well No. 40, Section 33—19-15.

In this well the sand at 2928 ft. was characterized by the K. T. and O. Company as a doubtful sand, meaning that it is an oil sand which may carry water. It is possible that the original cementing job on this well was a failure and, due to the position of the water string, it was practically impossible to bridge and test this sand.

The proposal of the K. T. and O. Company was that they cement this well again below this sand, after shooting up the former water string, with the intention of forcing cement above this sand and thereby protecting it, although the superintendent for the Standard Oil Company was of the opinion that the company in doing this work was shutting off an oil sand.

In view of the doubtful character of this sand and the fact that some of the adjoining wells of neighboring companies had shut off this sand, the proposal was approved by our department.

Complaint No. 3.

Inca Oil Company. Well No. 7, Section 24-20-14.

Under date of November 23, 1915, a written complaint was received from Mr. McQuigg, president of the Traders Oil Company, stating that he was of the opinion that the water from the Inca Oil Company well No. 7 directly affected Traders Oil Company well No. 9 on Section 24–20–14.

I replied to Mr. McQuigg, stating that a few days previous to receipt of this complaint the superintendent of the Inca Oil Company came to me to discuss the manner in which he should test this well for possible water trouble. I suggested that he carry out his idea of first testing the well with packer and later by plugging above the oil sand if necessary.

On December 9, 1915, Mr. McQuigg entered a supplemental complaint against the Inca Oil Company well No. 7, stating that he did not understand why there would be any unnecessary delay in the matter. I replied that the Inca Oil Company had started testing No. 7 well.

This well was tested by plugging to 1031 ft., which point was 30′

below the shoe of the water string. This test proved conclusively that this well was not making top water.

In view of the proof that Ineca well No. 7 could not be contributing to Traders No. 9 water trouble, I think that it would be well for the Traders Oil Company to carry out my suggestion of February 7th, and test their well No. 9 in order to determine if this well is making its own water.

Complaint No. 4.

Coalinga Midland Well No. 1. Section 10-19-15.

On October 5, 1915, the Shell Company called attention to the Coalinga Midland Oil Company well No. 1 stating that they had grave doubts as to the condition of this well and requesting that we make an investigation.

The Shell Company made a proposal to test out this well for the Coalinga Midland Oil Company, with the idea of determining whether or not it could be made a producer. If not, they proposed to abandon the well under the supervision of this department.

This proposal apparently was unsatisfactory to officials of the Midland Oil Company. After the failure of negotiations between the Shell Company and the Midland Oil Company nothing further was done.

In view of the foregoing I think that it would be well to order the Coalinga Midland Oil Company to open up this well with the idea of determining its physical condition or furnish sufficient proof that this well is not a menace to the possible producing sands on this section.

Complaint No. 5.

Traders Oil Company. Well No. 20.

Under date of April 22, 1916, a written complaint was received from the Ozark Oil Company stating that Traders Oil Company well No. 20, on Section 24–20–14 had been making about 48 per cent water for the past sixty days. The Ozark Oil Company stated that they considered that this well was a menace to their property.

This complaint was brought to the attention of the Traders Oil Company. Mr. McQuigg replied that this well did not make any perceptible amount of water.

An investigation was made of this well by taking a series of lead line samples. These samples showed that the well was making over 50 per cent water. Data were submitted on this well, covering tests made at the intervals from April 24, 1916, up to the present time. These tests show no change in the condition of the well.

The matter was taken up further with Mr. McQuigg of the Traders Oil Company on May 12, 1916, citing dates and results of lead line tests made by the Ozark Oil Company. These data were supplemented by similar tests made by this department. The monthly production report rendered by the Traders Oil Company showed this well to be making 10 per cent water from October, 1915, up to the present time. Mr. McQuigg's attention was called to the difference between these figures and the data submitted to him. He made no further reply in the matter.

In view of the fact that the figures given on the monthly production report of the Traders Oil Company are simply duplications of the figures given for the previous month, and that, in the case of above mentioned No. 20 well, the figures given are far from accurate, it is evident that the Traders Oil Company is not making an earnest effort to assist this department in the solution of the water problem in this particular part of the field.

There is very little free water being pumped. The well pumps a reddish emulsion testing 48 per cent water.

Aside from inaccuracy of figures presented by the Traders Oil Company I do not consider that the condition of this well is serious.

Complaint No. 6.

B. B. & E. R. Dudley Petroleum Company. Well No. 4, Section 5-27-21.

On February 5, 1916, Mr. F. Chappelett, field manager of the General Petroleum Company, called the attention of this department to the fact that the Dudley Petroleum Company had deepened No. 4 well into the lower oil sand without cementing off top water.

The facts of the case were that when the Dudley Petroleum Company was preparing to cement the 8¼″ string the casing froze at 1279 ft. and the well started flowing. Official tests were made of the production and none of them showed any water, and it was therefore concluded that water was shut off when casing froze up. This fact was communicated to Mr. Chappelett.

Complaint No. 7.

Universal Oil Company. Well No. 3, Section 5-27-21.

On February 5, 1916, Mr. Chappelett of the General Petroleum Company filed written complaint against the Universal Oil Company well No. 3, stating that this well was drilled into lower sand and was producing water.

This matter was taken up with the Universal Oil Company, and this company, at my request, made a 48-hour gauge of this well which showed the well to be making 15 per cent water in a total fluid production of 17 barrels.

A communication was sent to Mr. Chappelett informing him of the results of this test.

Complaint No. 8.

Belridge Oil Company. Well No. 6, Section 35-27-20.

On January 10, 1916, the attention of the San Francisco office of this department was directed to the heavy flow of gas wasting from the Belridge Oil Company well No. 6.

A conversation with the superintendent of this company brought out the following information:

While drilling this well a heavy flow of gas was encountered at 3750′ in shale. This gas came from behind the $6\frac{1}{4}''$ water string which was cemented at 3800 feet. Measurements showed a flow of over 3,000,000 cu. ft. of gas per day.

This matter was taken up with the Belridge Oil Company and after considerable discussion and some delay the flow of gas was put under control and the gas is now being sold to neighbors for drilling and lighting purposes.

SUMMARY OF WATER CONDITIONS.

Lost Hills District.

General statement.

The present producing area of the Lost Hills Field stretches along the crest of an anticline and is included in Sections 12, 13 and 24 in T. 26 S., R. 20 E., and 18, 19, 29, 30, 32 and 33 in T. 26 S., 21 E.; and Sections 4, 5 and 9 in T. 27 S., 21 E. The anticline plunges to the southeast. In the north end of the present proved area productive sands are encountered at a depth of 280′. The stratigraphic equivalent of the shallow north end sands appears to be missing in the south end of the field. The length of this area is six miles. The present proved area is approximately 2000′ wide in the north end and the southerly portion widens out to 4000 feet.

There are 261 wells in the Lost Hills Field. There were 212 wells producing during the month of June, 1916. These wells produced a total of 587,925 bbls. of fluid, of which 307,116 bbls. were water and 280,809 bbls. were oil. During the last year 10 wells were redrilled because of water trouble, and 18 wells were redrilled or deepened to increase production, and 2 wells abandoned, under the supervision of this department.

While it would seem from these figures that there is an extraordinary amount of water being produced in the Lost Hills Field, it must be remembered that a number of these wells produce large individual amounts of oil also. There are 14 wells in the Lost Hills Field which produce more than 5000 bbls. of water per month. One of these wells produces 80,000 bbls. of water per month.

The exact source of this water is somewhat cf a problem because records on wells drilled prior to the time this department started receiving reports are not at hand, the original condition of a number of wells is unknown. It is known, however, that in the case of most wells that produce heavy oil, the production showed considerable water from the time the wells were drilled into the oil sand. The records of the newer wells of which this department has received production reports reveal this same condition.

Causes of Water Infiltration.

In the southern part of the Lost Hills area, Sections 4 and 5 in T. 27 S., R. 21 E., the oil ranges in gravity from 30 to 38 degrees Baumé. Ninety per cent of the wells in this area produce no appreciable amount of water. The production of a number of wells in this area show no water at all by centrifugal tests.

In the northwest corner of this area three wells were deepened in order to produce from lower sands. In deepening, the top oil sand was shut off because of the appearance of water from an undetermined source. This top oil sand, which is showing water, is not present, so far as is known, in the southern end of the area under discussion.

The producing area, roughly defined by the boundaries of Section 32–26–21 yields both heavy oil and light oil production. The gravities range from 15 to 32 degrees Baumé. In the southwestern portion of this area three wells were deepened and the former top oil sands shut off on account of the water content. This procedure was followed because other wells in this area previously had been treated in this manner.

In the first well in this area, deepened under the supervision of this department, a bridge was set between the oil sand and shoe of water string. The well was bailed dry and stood so for three days. This demonstrated that top water was not moving into the oil sands. These deepening operations gave satisfactory results. The lower oil sand should be protected from upper water in every well in this area.

The Universal Oil Company well No. 1 on Section 30–26–21 (Discovery Well in Lost Hills Field), was tested for top water under the supervision of this department. The water string in the well consists of 300′ of stovepipe casing, landed 220′ above the oil sand. The test for top water was made by bridging up to 469′. The well was bailed dry and stood for 24 hours. This showed that the water that this well was making previous to test came through the oil sand. This may be edge water.

In the productive area north and west of Section 19–26–21, the wells drilled along the crest of the anticline generally do not need a water string. However, as wells are drilled out on the flanks of the anticline in this area, water appears in the initial production of the wells. Wells drilled in this area show, however, that water appears at a greater distance from the axis of the anticline in the deeper sands than in the top sands. It is therefore necessary to shut off top water at increasing depths stratigraphically as drilling progresses outward on the flanks of the anticline in order to get clean production from lower sands. The prevailing opinion among operators in this area is that this is an edge water condition.

It is a peculiar fact that in the area around the northeast corner of Section 24–26–20 no bottom water has been encountered in wells drilled 1000′ or deeper. In the south central part of Section 19–26–21, however, bottom water was encountered at 530′ and in the east central portion of Section 13–26–20, bottom water was found at 675′

The Baker and Henshaw Oil Company, drilling at the southwest corner of Section 12–26–20, encountered an oil sand at 1200′. It is probable that the formation from which this well is producing has not been encountered in Section 13–26–20. This company is now engaged in deepening well No. 1 on the same property with the idea of determining the water conditions in these lower formations.

New Wells.

The following notices of intention to drill new wells in the Lost Hills Field were received:

Section	Township	Range	Company	Number of new wells
2	25	19	Crescent Petroleum	1
3	26	20	B. B. & E. R. Dudley Petroleum Company	1
11	26	20	B. B. & E. R. Dudley Petroleum Company	1
12	26	20	Baker & Henshaw	2
13	26	20	Associated	23
			Lost Hills Development Company	8
			B. B. & E. R. Dudley Petroleum Company	8
24	26	20	California Star	9
19	26	21	Lost Hills Development Company	4
32	26	21	Universal Oil Company	1
4	27	21	General Petroleum Company	13
			Standard Oil	4
5	27	21	General Petroleum Company	2
			Standard Oil Company	1
			B. B. & E. R. Dudley Petroleum Company	2
9	27	21	Standard Oil Company	2
			B. B. & E. R. Dudley Petroleum Company	1
17	27	21	Associated Oil Company	1
			Total	84

Tests of Water Shut Off.

During the year covered by this report, ending July 1, 1916, 63 tests of water shut were made under the supervision of this department, in the Lost Hills District. With a few exceptions the tests of water shut off were accepted and passed by this department. In cases where the bailing tests did not prove satisfactory new water strings were put in where necessary, and in others pumping tests were ordered.

Early in the present year it became evident, because of the increasing amount of drilling, that it was not possible for the deputy supervisor to be present at all of the tests for water shut off. In order to relieve this situation special deputies were appointed to act for the deputy supervisor whenever he was unable to be present.

Thanks are due Messrs. W. L. McLaine, E. J. Schneider and R. E. Stearns, who have cooperated with the work of this department in acting without compensation as special deputies in the Lost Hills District, for the purpose of witnessing tests when it was impossible for me to be present.

SUMMARY OF WATER CONDITIONS.

Belridge District.

General statement.

There are two separate proven areas in the Belridge District. That area included in Sections 28, 29, 32, 33 and 34, T. 28 S., R. 21 E., and Sections 2 and 3, T. 29 S., R. 21 E., is known as the Belridge Field, and the producing area included in Sections 27, 34, 35 and 36, T. 27 S., R. 20 E., is known as the North Belridge Field. There are 152 wells in the Belridge District. Four wells have been abandoned under the supervision of this department and five wells deepened. In the Belridge District, up to July 1, 1916, there were seven tests for water shut off made under the supervision of this department.

During the month of June, 1916, there were 86 wells producing. The total fluid production was 131,533 barrels. Of this amount 31,390 bbls. were water and 100,143 were oil.

Infiltration of Water.

There are two oil zones in the Belridge Field. Practically all of the production comes from the upper oil zone. There are three wells producing from the lower oil zone. The upper oil zone production comes from sands. The depths of wells into this zone vary from 650′ to 900′. The wells of lesser depth are in the northern portion of the field. There is a body of brown shale approximately 2500′ thick between the upper and lower oil zones. The lower zone production comes from brown shale. The lower oil zone has been explored over a comparatively small area. The depth from which production has been obtained from the lower oil zone has been limited by bottom water. One well in this area was drilled to 4100′ and later plugged to 3170′.

There was no top water logged in the early wells drilled in this field. Some of these wells now produce water from an undetermined source. A well recently abandoned in the southern portion of this field, and plugged above oil sands to 439′, was converted into a water well, and is now producing over 500 barrels of water per day. This is conclusive evidence that there is top water in this area.

North Belridge Field.

In the North Belridge Field the surface formations, composed of sands and clays, are approximately 700′ in thickness. Below these surface formations is a body of brown shale of unknown thickness. One well in this field was drilled to 4760′ in brown shale. The production in this field comes from two distinct zones in the brown shale. Between these zones is a stratum almost barren of oil. Between the upper and lower oil zones there is a persistent water stratum at a depth varying from 3600′ to 3800′.

Several wells drilled recently show water at a depth of approximately 500′ below the surface. One of these wells in the northwest portion of the field encountered water at 1300′, establishing a fluid level 200′ below the surface. The water was shut off in this well at a depth of 1672′ and the well was finished at a depth of 2505′. This well started flowing early in March, 1916, and at this time is producing 125 barrels per day of clean oil.

The foregoing facts indicate that there is top water in this area. There is no evidence at hand to show that in the early wells drilled here the top water was taken care of. These wells produced from the upper oil zone and made from 40 to 60 bbls. of oil per day. There are five wells drilled into the lower zone. The other three were drilled into the lower zone originally. The production of these lower zone wells ranges from 200 to 900 bbls. per day. With the exception of two wells, producing from the lower oil zone, water has been shut off below 3800′.

The upper oil zone is being protected from water in new wells being drilled under the supervision of this department.

The following notices of intention to drill new wells in the Belridge District and vicinity were received:

Section	Township	Range	Company	Number of wells
22	27	20	Associated	1
27	27	20	Belridge Oil Company	1
34	27	20	Reward Oil Company	3
36	27	20	Standard Oil Company	1
36	27	20	Union Oil Company	1
33	28	20	Belridge	1
2	29	21	General Petroleum	2
3	29	21	General Petroleum	7
			Total	17

ANTELOPE FIELD.

Section	Township	Range	Company	Number of wells
8	27	19	Standard Oil Company	1
21	27	19	Mutual Development Association	1
			Total	2

SUMMARY OF WATER CONDITIONS.

Coalinga District.

General Statement.

The water conditions in the Coalinga District are not alarming. There are a number of wells requiring attention, such as redrilling or plugging, because of water trouble. During the past year there have been 67 wells redrilled for water trouble under the supervision of this department in the Coalinga District. During this time 78 tests of water shut off were witnessed at various wells. There were 58 wells redrilled or deepened to increase production. While there are a number of wells which show a high percentage of water in the fluid production the condition often is not a serious one because the total amount of fluid produced per day may be very small. That is, a well producing 10 barrels of fluid per day may show 50 per cent water but, of course, the total amount of water (5 barrels), produced per day is really small.

During the month of June, 1916, according to the monthly production reports furnished this department, there was a total fluid production of 1,456,665 barrels. Of this amount 482,997 bbls. of oil and 195,865 bbls. of water were produced in the West Side Field, and 715,910 bbls. of oil and 61,893 bbls. of water were produced in the East Side Field. This makes a total production of 1,198,907 bbls. of oil and 257,758 bbls. of water for the Coalinga District.

There are 1339 wells in the Coalinga District. There were 576 wells producing on the West Side during June, 1916, and 331 wells producing on the East Side. There was a total of 907 wells producing in June, 1916. There are 61 wells shut down because of water trouble. There are 131 abandoned wells. A number of these wells were abandoned because of water trouble. The remaining 240 wells are shut down for various reasons, such as lack of production, cleaning out, deepening, redrilling, etc.

Causes of Water Infiltration.

Among the causes for water infiltration in the Coalinga District is failure to shut off top water. These cases are rare, however, and usually where top water appears in a well it is due to deterioration of casing or water breaking in around the shoe of the water string. There are very few cases where water breaks in around the shoe unless the string has been disturbed. There are some cases on record where, in redrilling, dynamite for loosening pipe was accidentally exploded in the water string. There are other cases where top water broke in seemingly from agitation of water string in handling tools through it.

Bottom water comes into the sands either when the sand is drilled into or when the hole is stopped so close to the sand that the water breaks up through the dividing formation. This latter condition usually develops in a well after the fluid level has gone down. Then the bottom pressure becomes greater than that above the protecting stratum and the water is forced up into the oil formations. In this connection it is well to determine accurately, if data is available, the exact position of the bottom water strata so that drilling will not be carried too deep.

West Side Field.

The accompanying map of the West Side Field shows which wells have been drilled into bottom water. In one part of the field this is distinctly a bottom water. Moving westward, however, there are wells which produce oil from this same stratum. This is an edge water condition.

Edge Water.

It has been demonstrated that there are two distinct sands in the Coalinga West Side Field affected by edge water. This fact is revealed in the correlation of strata logged in numerous wells drilled into these sands.

The term, "edge water," is herein used as meaning that water indigenous to the down slope portions of an oil stratum, as the oil is removed from the stratum, water follows up the slope and replaces the oil.

The edge water in the Coalinga Field (the West Side), is by no means a menace to the productive life of the field. But the nature of these sands, if they are oil sands now, should be given full cognizance in any drilling program so that should the water appear in the oil portion of the edge sand at any time, it can be shut off and the well continue producing from more productive oil strata below.

In proven territory a fairly definite contact between the oil and water in the edge water stratum can be traced by the logs of the various wells drilled through this stratum. Certain wells which have penetrated this stratum will show oil while other wells, entering the stratum at points further down the dip will show water.

The following discussion of this edge water condition is offered as a key toward the elimination of a large amount of water trouble in the West Coalinga Field. The relative positions, with respect to other oil formations of the two edge water strata are shown in the accompanying map and cross-section (Fig. 13).

Sand No. 1 on the cross-section is the upper edge-water sand. The oil content of this sand in the south end of the field appears to be of little economic value. Toward the northern end of the field the amount of oil increases and many wells are getting production from this sand. This production is relatively of minor importance, however. The fluid produced by a number of these wells has gradually become entirely water. The rate of encroachment is slow, and depends largely on the rate at which the oil in the up slope portion of the stratum is removed. In a portion of Section 30–20–15 this encroaching water has traveled about 800′ in six years. It is only a matter of time until water will have moved into the oil portion of this stratum throughout its producing area.

There are twenty wells in which this edge sand has been cemented off. These wells were drilled with the idea of producing from the top edge water sand. In drilling a shut off was made of top water lying above the edge water sand. The other sixteen wells found oil originally in the edge water sand. With the exception of these twenty wells, all other wells east of the line A–A, shown on the map, shut off the top edge water sand on account of its water content. The line A–A shows the approximate original position of contact between water and oil in the top edge water sand.

In most cases where water has appeared in the edge water sand this sand has been cemented off. This is the only way to remedy this condition. In such cases this sand has become a top water sand and must be shut off in order to produce clean oil from lower formations.

The shale which lies just below the top edge water sand (No. 1) and covers the producing oil sand (No. 2) varies in thickness from 30′ or more in the western portion of the field to a thickness of 10′ in the eastern portion. As a result of this condition, especially in the thinner parts of the shale, great care must be exercised in order that top water which, of course, east of the line A–A includes top edge water, may be shut off in this shale body.

A great deal of attention is being given by this department to the proper handling of this situation. Several cases have arisen where in drilling new wells it has been necessary to indicate the exact depth at which the water string should be cemented. Recently an operator proposed to cement off with a string at a point which would have taken the casing through the shale into the productive oil sand. This department recommended a shut off sixty feet higher than the depth proposed.

It will be noted that the sand marked No. 3 is also an edge-water sand. The approximate contact between the water and oil is shown by the broken line B–B. The shale overlying this edge water sand varies in thickness from 5′ to 50′. This is a green colored, sandy, loose-formed shale and in many cases it has been found difficult to shut off in it.

This lower edge-water sand has been explored considerably. On the map those wells which have encountered bottom water are shown in circles.

West of the line B–B on Fig. 1 wells may be drilled to the brown shale without encountering the water. The thickness of the producing strata above the brown shale varies from 220′ in the southwestern part of Section 24–20–14, to 325′ in the north central part of Section 12–20–14. The lower edge water lying east and south of the line B–B has limited the depth to which wells may be drilled.

Records received by this department show that there are two wells now producing heavy oil from a formation which lies between the lower edge water sand and the brown shale. One of these wells was drilled on the north line of Section 6–20–15 and the other well on the west line of Section 18–20–15. It is possible that this heavy oil sand extends farther south and east and offers a source of further production.

In case any wells should be drilled through this lower edge water formation into the heavy oil production a shut off should be made in the green shale above the edge water sand in order to protect the upper oil formations. (Sands No. 2 and No. 3.)

The majority of the wells shown on the map as having encountered the lower edge water have been plugged successfully. Those wells which have not been plugged are now receiving the attention of this department.

Top Water.

There are several top water sands in the Coalinga West Side Field. The most persistent stratum of top water is sulphur water. The average distance of this sulphur stratum above the oil sand is about 300 feet.

Practically all of the water troubles in the wells west of the line B–B are due to top water. In some cases this top water has caused corrosion of the water string with subsequent failure. The remedy for this is a new water string or a packer. There are 14 wells in the West Side Field in which packers have been placed during the past year. In each case the work was beneficial. In the cases where packers have been set the indicator of the condition of a well is the fluid level. This level before packers were set ranged from 30′ to 300′ below the surface, and after setting packer in the fluid level, dropped several hundred feet in a short time.

Bottom Water.

By referring to the position of edge water sand No. 3, it will be noted that this sand, west of the line B–B, is virtually a bottom water sand. A study of the records at hand shows that west of the line B–B any bottom water encountered lies under the brown shale. The latter wells are shown in the squares on the map.

Chemical Analysis of Top and Bottom Waters.

Recent experiments made by certain operators in the Coalinga District have shown the practicability of identifying water as top water or bottom water by chemical analysis. There are certain water strata which have not been covered by chemical tests. Chemical analyses may show that the upper edge water (Fig. 15) carries about the same compounds in solution as does bottom edge water.

The writer wishes to acknowledge with thanks the following data on chemical analyses which have been furnished by the Associated Oil Company, the Coalinga Homestake Oil Company, Kern Trading and Oil Company, and the Nevada Petroleum Company.

Analyses of Water in Grains Per U. S. Gallon—Coalinga West Side Field.

TOP WATER.

Water from	Well	Section, township and range	Iron oxide and alumina	Total carbonates	Total chlorides	Total sulphates	Total solids
Associated	8D	36-20-14	1.13	26.65	56.81	139.98	224.57
Associated	9C	36-20-14	0.16	68.53	31.99	14.68	115.36
Associated	9D	36-20-14	Trace	9.86	21.15	125.98	156.99
Associated	1	36-20-14	0.84	6.47	38.93	181.26	227.50
K. T. & O.	7	31-20-15	0.12	11.73	46.72	199.68	258.25
K. T. & O.	41	25-20-14	6.53	6.06	41.58	191.41	245.58
K. T. & O.	2	25-20-14	2.27	11.39	21.74	87.61	123.01
K. T. & O.	25	25-20-14	6.12	15.74	35.46	146.78	204.10
K. T. & O.	47	25-20-14	15.92	90.55	51.83	30.48	188.78
K. T. & O.	24	25-20-14	0.00	13.07	14.83	217.70	245.60
Nevada Petroleum	3	30-20-15	2.56	9.06	53.21	103.49	168.32
BOTTOM WATER.							
Associated	3A	36-20-14	2.00	168.41	276.79	2.54	449.74
Associated	4C	36-20-14	0.30	145.60	301.00	2.10	449.00
Associated	5D	36-20-14	2.36	157.30	305.79	0.00	465.45
Associated	6C	36-20-14	3.30	145.80	286.00	1.90	437.00
Associated	1A	36-20-14	1.58	154.81	286.60	0.60	443.59
Associated	1B	36-20-14	0.66	90.94	391.11	6.97	555.02
Associated	8D	36-20-14	1.06	160.83	314.36	0.43	476.68
K. T. & O.	3	25-20-14	0.12	135.97	314.40	3.87	454.36
Shreeves	1	6-21-15	1.33	149.80	216.85	0.16	368.14
Nevada Petroleum	1	20-20-15	0.15	103.04	148.29	0.50	251.98
Coalinga Homestake	5	26-20-14	1.28	189.65	202.29	0.00	393.22
Coalinga Homestake	6	26-20-14	0.57	167.82	210.95	0.00	379.34

A comparison of the foregoing analyses of top water and bottom water shows that the top waters are high in sulphur content and low in ''salt'' content, while the reverse is true for bottom water. There is also a marked difference between the total grains of solid per gallon in top water and bottom water, the latter being the higher.

DECISIONS.

The following decisions were rendered by this office during the fiscal year ending July 1, 1916. The figures A–141, etc., refer to the report number. In many cases the company contemplating work on certain wells conferred with the deputy regarding the proposed work before submitting a formal written proposal, and as a result very few of the formal proposals received were rejected. In some cases where proposals for work on wells or estimates of depth of water shut off were not satisfactory, decisions were made covering the proper and necessary work. The supervision of work on oil wells by this department has raised the standard of operations. Formerly a company was permitted to perform any sort of an operation on a well. In some cases the results were disastrous to themselves and neighboring properties. There have been probably twenty-five cases during the fiscal year in which proposed work on wells was rejected in conferences with operators, consequently operators revised their plans, or gave up the idea of doing the work. This accounts in a measure for the fact that so many formal proposals were first informally presented to this department, and upon their being modified, were approved without recommendation for additional work.

Each proposal received was carefully examined to determine the probable effect the work might have on adjoining wells and the field in general.

During the early part of the year the form, "Report on Proposed Operations," was used only to cover deepening, redrilling, or abandoning proposals. At the present time this form is used to cover practically every proposal for work on wells, particularly for decisions on depth and manner of water shut off.

Among the proposals received which were given the closest attention were those to shut off or abandon oil sands. It frequently happens that oil sands on certain properties might be abandoned to the owner's advantage, but the result of such work would materially damage a neighboring property. This is particularly true where the oil content of sands in some areas has been practically exhausted and water permitted to enter these sands. There are cases in the Coalinga Field where new or undrilled territory would be seriously menaced if approval were given by this department to shut off certain oil sands, instead of protecting them from water.

SECTION 27, 18–15.

A–141. Shutoff. Standard, well No. 1. Test satisfactory.

SECTION 1, 20–15.

Letter October 9, 1916. Commenced drilling K. T. and O., well No. 1. Estimated depth of water shut off satisfactory.

A–115. Shutoff. K. T. and O., well No. 1. New well approved test of water shut off.

Notice May 5, 1916. Drill K. T. and O., well No. 5. Replied on form No. 113, May 6, 1916, stating that decision on proposed depth of water shut off be made at later date. Awaiting results on adjoining wells.

Notice May 5, 1916. Drill K. T. and O., well No. 5. Replied on form No. 113, May 6, 1916, stating that decision on proposed depth of water shut off would be made at a later date. Awaiting results on adjoining wells.

A–21. Shutoff. K. T. and O., well No. 14. New well test satisfactory.

Form No. 113, March 27, 1916. Commenced drilling K. T. and O., well No. 46. Estimated depth of water shut off satisfactory.

Form No. 113, March 27, 1916. Commenced drilling K. T. and O., well No. 47. Estimated depth of water shut off satisfactory.

SECTION 2, 20–15.

AA–94. Redrill and deepen, Shell Company, well No. 3. Proposal approved.

AA–43. Deepen. California Oil Fields, well No. 5. Approved proposal to drill out plug in the bottom and deepen the well about six feet in order to test the lower formations.

AA–79. Deepen. Shell Company well No. 10. Proposal approved to drill out cement plug in bottom and test out.

SECTION 2, 20–15—Continued.

AA–179. Plug bottom. Shell Company well No. 10. Approved proposal to plug the bottom up to about 3090′ on account of bottom water which was encountered after the old plug was drilled out.

AA–98. Redrill. Shell Company well No. 14. Approved proposal to redrill on account of crocked liner.

AA–44. Deepen. California Oil Fields, well No. 17. Approved proposal to deepen. In order to again test for bottom water and determine if possible contents of lower formations.

AA–71. Redrill. Shell Company well No. 19. Approved proposal to reperforate the oil string.

AA–74. Redrill. Shell Company well No. 19. Approved proposal to redrill to original depth, on account of oil string.

AA–163. Deepen. Shell Company well No. 19. Production unsatisfactory to company approved their proposal to deepen and test lower formations.

AA–80. Redrill. Shell Company well No. 20. Approved proposal to pull the upper portion of the 4½″ in order to perforate the 6¼″ cemented string to test out the upper oil sands which were shut off.

AA–31. Redrill. California Oil Fields, well No. 22. Approved proposal to put in liner and reperforate the oil string. Letter December 1, 1915. Resume drilling. California Oil Fields Limited well No. 25. Proposal satisfactory, after receiving further data concerning cementing point and depth of hole.

AA–72. Redrill. Shell Company well No. 25. Approved proposal to pulling oil string and redrill the well.

A–16. Shutoff. California Oil Fields well No. 27. Approved (new well top water shut off).

AA–52. Deepen. California Oil Fields well No. 28. Approved proposal to deepen from 3560′ to 3700′.

Form No. 113. November 12, 1915. Resume drilling California Oil Fields Limited well No. 29. Approved proposal to furnish cementing depth at a later date.

Form No. 113. March 31, 1916. Approved proposal cementing depth.

A–96. Shutoff. Shell Company well No. 29. New well test for shut off of top water satisfactory.

Form No. 113. January 22, 1916. Commenced drilling. Shell Company well No. 32. Approved estimated depth for shutting off water.

AA–199. Cement at about 3540′. Shell Company well No. 31. New well, approved proposal depth for shutting off top water.

SECTION 3, 20–15.

Letter from K. T. and O. September 13, 1915. Water shut off well No. 27. Test of water shut off satisfactory.

Letter from K. T. and O. September 13, 1916. Recement well No. 29. Proposal approved.

A–29. Shutoff. K. T. and O. well No. 29. Production test for top water satisfactory. Recommended drilling to old bottom and tested again before further deepening.

SECTION 4, 20–15.

AA–155. Abandon. Union Well La Vista No. 1. Recommended that plugging was not necessary as oil sands which were encountered were not protected by adjoining companies.

AA–156. Abandon. Union well No. 1, Coa. Monterey. Proposal approved.

AA–157. Abandon. Union Oil Company well No. 1, Guiberson. Proposal approved.

AA–158. Abandon. Union Oil Company well No. 4, La Vista. Proposal rejected. Recommended that company fully protect lower formations and that they submit plans for doing this work.

Section 6, 20–15.

AA–165. Redrill. American Petroleum Company well No. 18. Approved proposal. Oil string collapsed.

AA–159. Redrill. American Petroleum Company well No. 36. Approved proposal. Oil string collapsed.

A–107. Water shutoff. General Petroleum Company well No. 37. Test approved. New well top water.

AA–10. Redrill. American Petroleum Company well No. 44. Approved proposal to redrill to locate source of water trouble.

AA–121. Recement. American Petroleum Company well No. 44. Approved proposal to recement a lower depth in order to shut off water in upper formations.

AA–166. Redrill. American Petroleum Company well No. 54. Approved proposal to redrill on account of collapsed oil string.

AA–35. Redrill. General Petroleum Company well No. 1. Approved proposal to replace collapsed oil string.

AA–60. Redrill. General Petroleum Company well No. 1. Approved proposal to test for top water.

Form No. 113. March 4, 1916. Recement General Petroleum well No. 1. Approved cementing depth is proposed.

Form 113. April 9, 1916. Remove casing with rotary. General Petroleum well No. 1. Approved proposal to remove 11⅝", 9⅝" and 7⅝" in order to shut off water with 12½" at original place.

AA–180. Cement 12½" at 756′. General Petroleum Company well No. 1. Approved proposal to cement at this depth and if water is found to be shut off, that the company test again after entering the top oil sand.

AA–119. Deepen. General Petroleum Company well No. 4. Well free from water in upper oil sands. Approved proposal to prospect for lower oil sands.

AA–190. Redrill. General Petroleum Company well No. 4. Approved proposal to redrill to original depth, replacing the collapsed oil string.

AA–104. Redrill and deepen. General Petroleum Company well No. 27. Approved proposal to shut off top water.

A–91. Shutoff. General Petroleum Company well No. 27. Test of water string satisfactory. Recommended redrilling to original depth and pumped for further test before deepening.

Notice, June 20, 1916. Drill. General Petroleum Company well No. 34. Proposed depth of water shut off satisfactory.

Notice, June 5, 1916. Drill. General Petroleum Company well No. 35. Proposed depth of water shut off satisfactory.

Form No. 113. May 17, 1916. Commence drilling General Petroleum Company well No. 36. Approved estimated depth of water shut off as proposed.

A-129. Shutoff. General Petroleum Company well No. 36. Test approved. New well top water.

Form No. 113. April 7, 1916. Commenced drilling General Petroleum well No. 37. Proposed depth of water shut off satisfactory.

AA–87. Deepen. New San Francisco Crude Oil Company well No. 9. Top oil sands free from water. Approved proposal to deepen to lower sand.

AA–50. Deepen. New San Francisco Crude Oil Company well No. 10. Upper oil sands free from water. Approved proposal to deepen to lower oil sand.

Section 7, 20–15.

AA–78. Redrill. Coalinga Pacific O. and G. Company well No. 1. Collapsed oil string proposal approved.

AA–137. Redrill. Coalinga Pacific O. and G. Company well No. 1. Collapsed oil string proposal approved.

AA–176. Set in liner. Coalinga Pacific O. and G. Company well No. 1. Proposal approved.

AA–5. Redrill. K. T. and O. well No. 35. Approved proposal to shut off upper oil sand in order to shut out the mud and shale. The upper sand in this well was free from water.

SECTION 11, 20–15.

Letter from K. T. and O Company September 13, 1915. Water shut off well No. 31. Test satisfactory. Test for top water.

Letter October 22, 1915. Approved proposal to plug off bottom sand on account of water.

Letter December 20, 1915. Test for top water. Approved plan proposing to place a bridge under the water string.

AA–27. Redrill. K. T. and O. well No. 31. Approved proposal to shoot bottom of well and cement liner through intermediate water sand so that lower oil sand could be tested through the liner.

Form No. 113. March 7, 1916. Approved proposal to redrill hole to original depth and plug back with cement, in order to shut off bottom water.

Form 113. April 25, 1916. Approved proposal to make pumping test for water shutoff.

AA–204. Plug bottom. K. T. and O. well No. 31. June 20, 1916. Approved proposal to clean out and shoot bottom of well and plug up to 3900′. Recommended that company drill and plug to about 3930′ in case water was found to be shut off.

AA–125. Redrill. K. T. and O well No. 30. While trying to recover a packer the oil string parted. Approved proposal to redrill and land new oil string at original depth.

SECTION 12, 20–15.

AA–11. Redrill. Coalinga Mohawk well No. 4. Approved proposal to put cement in the bottom of the hole to shut off water. Also approved proposal to put in liner.

AA–30. Redrill. Coalinga well No. 4. December 7, 1915. Approved proposal to cut off 12′ of water string that is in poor condition, drill up this pipe, then dump in cement up around the liner. Then clean out through and perforate the liner and test again for water.

AA–77. Redrill. Coalinga Mohawk well No. 4. March 13, 1916. Approved proposal to loosen up the water string and recement at the same depth. This approval was given, providing that the company demonstrate to this department that the upper oil sands which were to be shut off, on account of an intermediate water sand were fully protected from water. New well test showed top water satisfactorily shut off.

AA–51. Redrill. Coalinga Mohawk well No. 5. December 30, 1915. Approved proposal to redrill to bottom of old hole and shoot and cement, in order to shut off bottom water.

Form No. 113. April 7, 1916. Coalinga Mohawk well No. 5. Approved proposal to pull the oil string and replug the hole at a lower depth and test again in order to determine, if possible, the location of the bottom water.

Form No. 113. December 7, 1915. Commenced drilling. Coalinga Mohawk well No. 7. Approved estimated depth for shutting off top water.

Form No. 113. April 7, 1916. Commenced drilling Coalinga Mohawk well No. 8. Estimated depth of water shut off satisfactory.

SECTION 18, 20–15.

Letter September 25, 1915. Redrill. American Petroleum well No. 4. Approved proposal to test for top water with packer.

A–8. Shutoff. American Petroleum Company well No. 4. Bridge of rope rock and cement placed under water string, in order to test for possible top water. Test proved that well was not making top water.

AA–9. Redrill. American Petroleum Company well No. 6. Approved proposal to redrill on account of oil string, and shut off water and redrill to original depth.

A–128. Shutoff. American Petroleum Company well No. 6. Packer set to shut off top water. June 17, 1915. Witnessed production test. Recommended that company pump well for ninety days longer as further test for water shut off.

SECTION 18, 20–15—Continued.

AA–7. Redrill. American Petroleum Company well No. 7. October 29, 1916. Approved proposal to redrill on account of collapsed oil string.

Form No. 113. January 17, 1916. Redrill. American Petroleum Company well No. 7. The proposal was to test for water, proposing to mud up an intermediate water sand between the oil sands and cement the 8¼″ below the water sand. This proposal was held up awaiting further data on the mudding process.

AA–73. Redrill. American Petroleum Company well No. 7. March 10, 1916. Approved proposal to test wall to determine source of water recommended that this department be notified so that important facts may be witnessed.

AA–93. Redrill. American Petroleum Company well No. 7. March 30, 1916. Approved proposal to cement 8¼″ casing below edge water sand, providing company prove to this department that upper oil sands would be protected from water.

A–124. Shutoff. American Petroleum Company well No. 7. The test indicated that water above the cementing was excluded from the lower oil formations. The conclusion recorded in this report stated that there was no evidence at hand to prove that the oil formations above 1671′ (new cementing point) were protected from water and that damage might be ensuing.

AA–95. Redrill. American Petroleum Company well No. 24. Approved proposal on account of collapsed oil string.

Letter September 25, 1915. Redrill. American Petroleum Company well No. 8. Approved proposal to recement off top water above the "edge water" sand.

Form No. 113. January 17, 1916. Withheld approval to proposal to shut off top water below the oil sand recorded from 1415′ to 1456′. Well remains shut down.

Form No. 113. March 31, 1916. Commenced drilling. Welch and Chandler well No. 16. Proposed depth of water shut off about 50′ too high. This matter is to be adjusted later.

AA–53. Redrill. American Petroleum Company well No. 31. Proposal approved. Oil string collapsed.

SECTION 19, 20–15.

AA–161. Redrill. K. T. and O. well No. 3. Approved proposal to set packer in water string in order to shut off probable top water.

A–136. Shutoff. K. T. and O. well No. 3. Witness production test after packer had been set for nineteen days. Recommended that company pump the well for sixty days longer, when another test would be witnessed.

A–6. Shutoff K. T. and O. well No. 11. Old well recemented on account of top water. Test of new water string proved satisfactory.

A–126. Redrill. American Petroleum Company well No. 3. Approved proposal to put in a number of plugs in order to determine the source of the water.

A–108. Shutoff. American Petroleum Company well No. 3. Packer set in water string. Fluid level test witnessed. Recommended that the company pump the well sixty days at which time production test would be witnessed.

AA–54. Redrill. American Petroleum Company well No. 14. Oil string collapsed. Approval proposal to renew oil string and redrill to original depth.

SECTION 20, 20–15.

Letter September 25, 1915. Nevada Petroleum well No. 1. Approved proposal to test to determine source of the water by plugging between the oil sands and under the water string.

A–12. Shutoff. Nevada Petroleum Company well No. 1. October 21, 1915. Bridge under water string test showed that well was probably not making top water. Recommended plugging bottom of hole.

AA–92. Redrill. Nevada Petroleum well No. 1. March 24, 1916. Approval proposal to again test water string by bridging cementing for bottom water proved unsuccessful.

SECTION 20, 20–15—Continued.

AA–175. Plug bottom. Nevada Petroleum Company well No. 1. June 9, 1916. Recommended that the company carry out their plan of shooting and replugging the bottom of the well.

SECTION 30, 20–15.

All papers concerning wells of Creme Petroleum Company. See complaints, Coalinga field.

Letter September 25, 1915. Redrill. American Petroleum well No. 4. North 30. Approved proposal to reset packer in order to shut off possible top water.

AA–10. Shut off. American Petroleum Company well No. 1. North 30. Test made by bridging under water string. Test proved that well was not making top water. Recommended that company cement off the sand recorded from 1705 to 1715. This is an edge water sand on eastern part of the company's property.

Letter October 15, 1915. Redrill. American Petroleum well No. 23. Acknowledging receipt of record of work done in placing bridge over oil sand. The work on this well was completed before a notice was received.

SECTION 1, 20–14.

AA–105. Redrill. Amity Oil Company well No. 1. Approved proposal to reperforate oil string.

AA–181. Redrill. Pennsylvania Coalinga Petroleum Company well No. 10. Approved proposal to redrill and deepen. Prospecting for lower oil sand water condition of well satisfactory.

SECTION 12, 20–14.

AA–59. Redrill. Spinks Crude Oil Company well No. 1-E. Water condition satisfactory. Approved proposal to replace oil string on account of collapsed casing.

AA–132. Deepen. Homestead Development Company well No. B-6. Approved proposal to deepen to the lower oil sands.

AA–164. Redrill. Homestead Development Company well No. B-8. Approved proposal to pull oil string and set in a liner in its place.

AA–203. Redrill. Homestead Development Company well No. 3-C. Approved proposal to replace liner.

SECTION 13, 20–14.

AA–6. Redrill. K. T. and O. well No. 23. Old well approved proposal to plug off bottom water.

Form No. 113. February, 1916. Well No. 23. Approved proposal to put in bridge and test water string, and if well was found to be making top water to recement the 8¼″.

A–79. Shutoff. K. T. and O. well No. 23. Test was made through tubing which was cemented in the water string. Test indicated that top water was shut off. Approved proposal to shut well down for sixty days, awaiting results on neighboring wells.

A–131. Shutoff. K. T. and O. well No. 23. Refer to report AA–79. Well tested again for top water after remaining shut down over two months. Approved proposal of company to have well shut down three months longer.

A–20. Shutoff. K. T. and O. well No. 31. New well approved test for shut off of top water.

AA–41. Redrill. K. T. and O. well No. 10. Approved proposal to set packer to shut off top water.

A–113. Shutoff. K. T. and O. well No. 10. Old well. Production test recommended that company pump well for ninety days longer. Production of well and fluid level indicated improvement since packer was set.

A–114. Shutoff. K. T. and O. well No. 18. Old well. Production test fluid level and production of well indicated improvement in condition of well. Recommended that company pump the well for ninety days longer, when another test would be witnessed.

Letter October 13, 1915. Redrill. Union Oil Company well No. 14. Approved proposal to set packer in order to shut off top water.

SECTION 14, 20–14.

AA–201. Redrill. Western Oil and Gas Company well No. 6. Approved proposal recement off top water.

SECTION 23, 20–14.

AA–14. Redrill. St. Paul Consolidated Oil Company well No. 6. Approved proposal to plug the well from the bottom up to the water string if necessary, to locate the source of the water.

AA–208. Recement. St. Paul Consolidated well No. 6. Approved proposal to pump cement behind the 10″ water string.

AA–13. Redrill. St. Paul Consolidated Oil Company well No. 9. Approved proposal to shut off top water.

A–67. Shutoff. St. Paul Consolidated Oil Company well No. 9. Oil well witnessed bailing test and on account the small amount of hole below the water string, recommended pumping test to be witnessed thirty days after the well started producing.

A–125. Shutoff. St. Paul Consolidated Oil Company well No. 9. Refer to AA–67. Production test proved that top water was satisfactorily shut off.

AA–162. Redrill. St. Paul Consolidated Oil Company well No. 2. Approved proposal to bridge under water string, then perforate water string so that cement could be pumped through the perforations to protect an oil sand formerly shut off.

SECTION 24, 20–14.

Letter October 4, 1915. Abandon Inca Oil Company well No. 4. Approved proposal plan for plugging and abandoning.

Letter February 14, 1916. Abandonment Inca Oil Company well No. 4.

Letter Traders Oil Company vs. Inca Oil Company well No. 7. February 7, 1916. (See complaints, Coalinga field.)

AA–37. Redrill. Inca Oil Company well No. 7. Approved proposal to test water string by bridging below the shoe.

A–36. Shutoff. Inca Oil Company well No. 7. Test proved that the well was not making water from above the top of plug, which was about 30′ below the shoe of the water string.

AA–99. Redrill. Inca Oil Company well No. 17. Approved proposal to pull the oil string and test the water string for possible top water.

A–101. Shutoff. Inca Oil Company well No. 17. The test proved the water which the well produced did not come from above the top of the bridge which was placed 45′ below the shoe of the water string.

AA–142. Redrill Inca Oil Company well No. 33. Approved proposal to move collapsed oil string and put in bridge under the water string to test for possible top water.

AA–17. Redrill. Claremont Oil Company well No. 5. Approved proposal to set packer to shut off top water.

A–24. Shutoff. Claremont Oil Company well No. 5. Old well production test. Packer set to shut off top water. Test showed that top water was shut off.

AA–18. Redrill. Claremont Oil Company well No. 14. Approved proposal to bridge under water string to determine if well is making top water.

A–28. Shutoff Claremont Oil Company well No. 14. Old well bridge under water string. Test proved that well was not making top water.

AA–69. Redrill. Salvia Oil Company well No. 9. Approved proposal to pull out string in order to set packer to shut off top water.

A–88. Shutoff. Salvia Oil Company well No. 9. Packer set to shut off top water. Well had produced about two months when fluid level test indicated improvement in water condition. Recommended pumping sixty days longer for further test.

AA–81. Redrill Salvia Oil Company well No. 13. Approved proposal to pull oil string and set packer to shut off top water.

SECTION 24, 20–14—Continued.

A–102. Shutoff. Salvia Oil Company well No. 13. Packer set to shut off top water. After setting packer the fluid in the well dropped from 60′ to 1050′ from the surface in thirty-one days. This indicated an improvement in the water condition. Recommended that company pump well for sixty days longer. At end of this time another test to be witnessed.

AA–102. Redrill. Salvia Oil Company well No. 2. Approved proposal to redrill in order to increase production of the well. Water condition satisfactory.

AA–101. Redrill Salvia Oil Company well No. 6. Approved proposal to pull the oil string in order to set packer to shut off top water.

A–134. Shutoff. Salvia Oil Company well No. 6. Old well. Packer set to shut off top water. The change in fluid level in the well after the packer had been set and well pumped showed improvement in the well. Recommended pumping ninety days longer for further test.

AA–138. Redrill. Salvia Oil Company well No. 14. Approved proposal to pull oil string and set packer to shut off top water.

A–135. Shutoff. Salvia Oil Company well No. 14. Packer set to shut off top water. Production test indicated improvement in the water condition of the well. Recommended pumping for ninety days longer; at end of this time another test would be witnessed and further recommendations made.

AA–89. Redrill. Premier Oil Company well No. 1. Approved proposal to shoot well at about 1100′ and to place bridge at about 1075′ to test well for water and, if found, to cement the 6⅝″ at about 1100′.

A–122. Shutoff. Premier Oil Company well No. 1. Test made to determine if water came around shoe of water string. Recommended that plug be drilled out and hole replugged at a lower depth, to test formations below top of original plug.

AA–88. Redrill. Traders Oil Company well No. 34. Approved proposal to pull oil string in order to set packer to shut off top water.

A–77. Shutoff. Traders Oil Company well No. 34. Packer set to shut off top water, production test proved that top water was satisfactorily shut off.

AA–107. Redrill Traders Oil Company well No. 24. Approved proposal to pull the oil string in order to replace the collapsed casing.

Notice, May 22, 1916. Redrill Traders Oil Company well No. 26. This proposal was not approved on account of the company's noncompliance with the law in the matter of well logs. A copy of General Departmental Orders of May 6, 1916, was mailed to the company.

Notice, June 17, 1916. Redrill Traders Oil Company well No. 15. Did not approve proposal to redrill on account of the company's noncompliance with the law in the matter of furnishing this department with log records. Mailed the company departmental orders of May 6, 1916. The company ignored all of these rulings and redrilled the well without approval.

Letter April 24, 1916. Ozark Oil Company vs. Traders well No. 20. See complaints Coalinga Field.

AA–184. Redrill. Claremont Oil Company well No. 1. Approval proposal to set packer to shut off possible top water.

SECTION 25, 20–14.

AA–42. Redrill. K. T. and O. well No. 25. Approved proposal to pull out liner and set heaving plug in oil string.

AA–97. Redrill. K. T. and O. well No. 35. Approved proposal to pull oil string and bridge hole under water string, for the purpose of location of possible water in the well.

A–110. Shutoff. K. T. and O. well No. 35. Plug put in below the water string. Test proved that the source of the water which the well made was below the top of the plug. Recommended replugging at a lower depth in order to make a further test.

SECTION 25, 20–14—Continued.

AA–160. Redrill. K. T. and O. well No. 54. Approved proposal to put in a new packer in order to shut off top water.

A–137. Shutoff. K. T. and O. well No. 54. Packer set to shut off top water. After producing twenty-six days, the well still produced all water. Recommended that the company pump the well sixty days longer, at the end of which time another production test would be witnessed and further recommendations made.

Letter October 15, 1915. Abandon K. T. and O. well No. 5. Approved proposal plan of plugging and abandonment.

Letter October 15, 1915. Abandon K. T. and O. Company well No. 4. Approved proposed plan of plugging and abandonment.

SECTION 26, 20–14.

AA–103. Redrill. Coalinga Homestake Oil Company well No. 1–A. Approved proposal to pull oil string in order to clean out and reland at about original depth.

AA–133. Pull oil string. Coalinga Homestake Oil Company well No. 1–A. Approved proposal to pull out the oil string and produce from open hole.

AA–197. Shutoff top water. Coalinga Homestake Oil Company well No. 6. Approved proposal to test water string and in case water was found, that the water string be recemented at the same depth as not cemented.

Letter March 3, 1916. Change number. Coalinga Homestake well No. 7. Permission was granted to change the number from 7 to 1–A.

AA–56. Redrill. Smith and Pevey (Netherlands Oil Company) well No. 3. Approved proposal to test water string by bridging under the shoe, and in case water was found that a new water string be cemented at about 783′.

A–80. Shutoff. Netherlands Oil Company well No. 3. On account of being unable to establish that the hole was open below the shoe of the new water string, recommended that plug be drilled out and well pumped for further test of water shut off.

SECTION 36, 20–14.

AA–55. Redrill. Associated well No. 9–D. Chemical analysis of water from the well indicated top water. Approved proposal to test water string by bridging below the shoe.

AA–84. Redrill. Associated well No. 9–D. Approved proposal to cement the 8¼″ between the 10″ casing and the top of the oil sand.

A–138. Shutoff. Associated well No. 9–D. Production test indicated that top water was properly shut off. Recommended pumping for sixty days longer, when another test would be witnessed.

AA–106. Redrill. Associated well No. 8–D. Approved proposal to test 10″ casing with packer and if water is found to cement the 8¼″ about 30′ below the shoe of the 10″ casing.

A–139. Shutoff. Associated well No. 8–D. The 8¼″ was cemented and the packer which formerly shut off top water eliminated. Recommended that company plug the bottom of the hole as the chemical analysis of water from the well indicated bottom water.

AA–170. Abandon. Associated well No. 9–I. Approved proposal plan for plugging and abandoning. Recommended that company ascertain that each cement plug be set properly.

SECTION 2, 19–15.

AA–76. Deepen. General Petroleum Company well No. 6. Recommended deepening as proposed.

AA–15. Redrill. General Petroleum Company well No. 7. Recommended redrilling as proposed top sand to be shut off on account of water.

A–43. Shutoff. General Petroleum Company well No. 7. Old well. Test for shut off of top water satisfactory.

AA–49. Redrill. General Petroleum Company well No. 9. Well to be tested for water. Recommended that company test as proposed.

SECTION 10, 19–15.

Letter, October 9, 1915. Recondition well No. 1, Coalinga Midland Oil Company.

Letter, September 27, 1915. California Oil Fields, Limited, well No. 2. Approved plan to test upper sands to determine their contents.

A–23. Shutoff. California Oil Fields, Limited, well No. 2. Production test O. K. Test made of sands formerly shut off. These sands now produce about 100 barrels of oil per day.

AA–20. Redrill. California Oil Fields, Limited, well No. 7. Approved plan to test the upper sands, formerly shut off.

A–31. Shutoff. Shell Company well No. 7. Test of water shut off satisfactory. Recommended testing upper formations before deepening to original depth.

AA–115. Recement. Shell Company well No. 7. Approved company's plan of cementing at a lower depth on account of upper formations containing water.

AA–34. Redrill and deepen. California Oil Fields, Limited, well No. 8. Approved proposal to recement at a higher point in order to test formations formerly shut off. Recommended testing by pumping before deepening below original depth.

A–39. Shutoff. Shell Company well No. 8. Test satisfactory.

Form No. 113. February 24, 1916. Test water string Shell well No. 8. Approved proposal to test by plugging a few feet under the water string.

Letter, March 6, 1916. Test of water string Shell well No. 8. Test approved. Recommended that company follow their plan of drilling out plug by stages and testing in order to locate the water.

SECTION 11, 19–15.

AA–26. Redrill. K. T. and O. Company well No. 16. Approved proposal to recement at the original depth.

A–40. Shutoff. K. T. and O. well No. 16. (See correspondence.) Test showed that top water was probably shut off. Approved proposal to land oil string at original depth and recommend pumping for further test of water shut off.

AA–4. Abandon. K. T. and O. Company well No. 39. Approved method of plugging as proposed.

SECTION 14, 19–15.

AA–75. Deepen. Shell Company well No. 1. Approved proposal to deepen from 1565′ to 1700′.

Letter, October 9, 1915. California Oil Fields, Limited, well No. 4. Approved plan of redrilling to determine condition of hole. This well was formerly plugged and abandoned.

A–32. Shutoff. Shell Company well No. 4. Test of water string satisfactory. Recommended "drilling in" and that pumping test be made to determine contents of lower formations.

A–41. Shutoff. Shell Company well No. 4. Production test proved satisfactory. This well was formerly abandoned. The present management redrilled the well and got a production of about 250 barrels of clean oil per day.

Letter, September 27, 1915. California Oil Fields, Limited, well No. 6. Approved proposal to test by pumping and if water was excessive that bottom of the hole be replugged.

AA–113. Shell Company well No. 6. Test water string. Approved proposal to bridge under the water string in order to test the well for possible top water, and note what efforts, if any, this might have on wells. Nos. 14 and 16 on same section.

AA–90. Redrill and deepen. Shell Company well No. 11. Approved proposal to drill out cement plug in bottom of hole in order to test the lower formations.

AA–114. Recement. Shell Company well No. 11. Approved proposal to loosen the 8¼″ water string and recement same in order to shut off top water.

A–123. Shutoff. Shell Company well No. 11. Bailing test not entirely conclusive, so recommended drilling ahead 40′ and make further test by pumping for about 60 days, at which time another test would be witnessed.

SECTION 14, 19–15—Continued.

Letter, September 27, 1915. California Oil Fields, Limited, well No. 14. Approved proposal to recement the well in order to shut off probable top water.

Letter, November 17, 1915. Approved proposal to make pumping test rather than bailing test for water shut off.

Letter, February 14, 1916. Giving data on production test witnessed on February 2d, and stating that further test would be witnessed after the well had been deepened.

Form No. 113. Approved proposal to redrill and deepen to original depth. Various letters rewell No. 14, Shell Company.

Letter, September 27, 1915. Recement Shell Company No. 16. Approved proposal cementing depth in order that a supposed sand formerly shut off could be tested, called attention to possible doubtful character of upper formations in this vicinity, particularly on account of depth of shut off on neighboring wells.

A–14. Shutoff. California Oil Fields well No. 16. Test of water string approved. Recommended drilling to original depth and test by pumping before further deepening.

A–22. Shutoff. California Oil Fields well No. 16. Production test satisfactory.

Form No. 113. January 10, 1916. Deepen Shell well No. 16. Approved proposal to deepen to about 1800′.

SECTION 15, 19–15.

AA–58. Deepen. Shell Company well No. 1. Approved proposal to drill the well 150′ deeper.

SECTION 17, 19–15.

AA–28. Redrill. Jeremiah Miller well No. 1. Approved proposal to plug bottom of hole in order to shut off water.

AA–85. Redrill. Western Oil and Gas Company, Limited, well No. 1. Approved proposal to pull a liner and shoot oil sand in order to increase production.

AA–86. Redrill. Western Oil and Gas Company, Limited, well No. 2. Approved proposal to clean out and plug off bottom water.

Form No. 113. Commence drilling well No. 6, Western Oil and Gas Company called for details concerning manner in which water was to be shut off. Company replied stating that they had changed their plans and would not drill the well.

SECTION 22, 19–15.

AA–118. Redrill. Caribou Oil Company well No. 5. Approved proposal to reperforate the oil string.

AA–117. Redrill, Caribou Oil Company well No. 7. Approved proposal to reperforate the oil string.

AA–144. Redrill. Caribou Oil Company well No. 8. Approved proposal to reperforate the oil string.

SECTION 26, 19–15.

Letter, September 18, 1915. Redrill. Shell Company well No. 3. Proposal satisfactory.

Letter, September 18, 1915. Redrill. Shell Company well No. 7. Proposal satisfactory.

A–4. Shutoff. California Oil Fields, Limited, well No. 15. Production test for shut off of top water, test satisfactory.

AA–123. Deepen. Shell Company well No. 15. Approved proposal to deepen.

Letter, October 18, 1915. Cementing depth California Oil Fields, Limited, well No. 16. Approved proposal to shut off water in order to test upper sands. These sands were shut off in adjoining wells.

AA–206. Recement. Shell Company well No. 16. Proposal approved.

SECTION 27, 19–15.

AA–33. Redrill. California Oil Fields well No. 2. Approved proposal to pull $6\frac{5}{8}''$ oil string.

SECTION 27, 19–15—Continued.

AA–46. Redrill. California Oil Fields well No. 3. Approved proposal to pull $6\frac{5}{8}''$ string.

AA–29. Redrill. California Oil Fields well No. 4. Approved proposal to pull portions of $6\frac{5}{8}''$ oil string and perforate.

Letter, September 18, 1915. Redrill California Oil Fields, Limited, well No. 6. Proposal satisfactory.

AA–45. Redrill. California Oil Fields well No. 24. Approved plan to pull a portion of the $6\frac{5}{8}''$ oil string and perforate.

Letter, October 8, 1915. Redrill. California Oil Fields well No. 7. Approved proposal to redrill in order to increase production.

AA–3. Redrill. California Oil Fields well No. 25. Approved proposal to pull $6\frac{5}{8}''$ string and test out for production.

A–133. Shutoff. Shell Company well No. 23. Approved test of water string, which was recemented. Shall witness production test three months after completion.

AA–25. Redrill. California Oil Fields well No. 28. Approved proposal to pull a portion of the $6\frac{5}{8}''$ oil string.

AA–23. Redrill. California Oil Fields well No. 29. Approved proposal to pull portion of $6\frac{5}{8}''$ oil string.

Letter, October 8, 1915. California Oil Fields well No. 33. Approved proposal to pull liner and test for production.

A–11. Shutoff. California Oil Fields well No. 35. Top water recemented off.

AA–1. Redrill. California Oil Fields well No. 35. Approved proposal to deepen.

AA–2. Redrill. California Oil Fields well No. 37. Approved proposal to reperforate.

AA–32. Redrill. California Oil Fields well No. 44. Approved proposal to pull liner.

SECTION 28, 19–15.

Notice, September 17, 1915. Deepen. Standard well No. 16. Proposal satisfactory.

AA–57. Redrill. Standard well No. 56. Approved proposal to pull $6\frac{1}{4}''$ line and redrill with $8\frac{1}{4}''$ casing.

Form No. 113. February 18, 1916. Resume drilling. Standard well No. 97. Withheld decision on proposed depth for shutting off water, awaiting results on adjoining wells. Decision to be rendered later and before shutting off point is reached.

SECTION 29, 19–15.

Letter, September 27, 1915. Test water shut off. California Oil Fields, Limited, well No. 5. Approved proposal to make pumping test of sand from 2655′ to 2670′.

Letter, October 8, 1915. Deepen. Shell Company well No. 5. Approved proposal to deepen and prospect for oil sands, before again shutting off water.

Letter, November 12, 1915. Shell Company well No. 5. Approved proposal depth for shutting off top water.

A–42. Shutoff. Shell Company well No. 5. Production test satisfactory.

Letter, May 5, 1916. Shell Company well No. 6. Recommended shutting off top water at about 2700′. The proposal was to shut off at 2800′.

Letter, May 8, 1916. Shell Company well No. 6. Approved new proposal to shut off top water at about 2640′.

SECTION 31, 19–15.

AA–154. Redrill. W. M. and M. Oil Company well No. 4. Approved proposal to redrill to original depth and shoot and plug the bottom of the hole on account of possible bottom water.

AA–127. Redrill. Commercial Petroleum Company well No. 6. Approved proposal to replace oil string which had collapsed.

SECTION 32, 19–15.

AA–65. Redrill. Coalinga Empire Oil Company well No. 2. Approved proposal to cut off and side track about 25′ of the old water string and cement new water string at about same depth as original water string.

Letter, October 5, 1915. Deepen. American Petroleum Company well No. 1. Approved proposal to deepen to next oil sand.

AA–83. Redrill. American Petroleum Company well No. 19. Approved proposal to redrill on account of collapsed oil string.

AA–82. Redrill. American Petroleum Company well No. 37. Approved proposal to redrill on account of collapsed oil string.

Form No. 113. April 11, 1916. Drilling. Pantheon Oil Company well No. 3. Your letter April 10, 1916, called the attention of the company to the fact that notice of intention to drill this well had not been received, although drilling had commenced.

A–1. Shutoff. Call Oil Company well No. 3. (Well redrilled on account of top water.) Test satisfactory.

SECTION 33, 19–15.

Letter, December 13, 1915. Recement K. T. and O. well No. 40. Approved proposal to recement below doubtful sand found below point of original shut off.

A–44. Shutoff K. T. and O. well No. 40. New well. Test for shutoff of top water satisfactory.

SECTION 34, 19–15.

AA–36. Deepen. California Oil Fields well No. 19. Approved proposal to deepen about 80′.

AA–40. Deepen. California Oil Fields well No. 20. Approved proposal.

Letter, October 8, 1915. California Oil Fields, Limited, well No. 28. Approved proposal to drill to shale under first oil sand and land oil string to test water shut off by pumping. (Water shut off at 2156′.)

A–13. Shutoff. California Oil Fields, Limited, well No. 28. New well, production test satisfactory.

A–5. Shutoff. California Oil Fields well No. 29. New well test satisfactory.

AA-112. Deepen. Shell Company well No. 29. Proposal approved.

A–61. Shutoff. Shell Company well No. 31. Test of water string satisfactory.

Form No. 113. April 15, 1916. Shell Company well No. 31. Approved proposal to recement again at lower depth (2290′), on account of finding water below the former cementing point.

AA–131. Shoot casing. Shell Company well No. 31. Approved proposal to shoot casing in order to recement off water.

SECTION 35, 19–15.

Letter, October 8, 1915. Commence drilling K. T. and O. well No. 16. Estimated depth for shutting off water satisfactory.

A–51. Shutoff. K. T. and O. well No. 16. New well. Top water test satisfactory.

AA–120. Plug bottom. K. T. and O. well No. 16. Proposal approved.

A–112. Shutoff. K. T. and O. well No. 16. Bottom water test satisfactory.

Form No. 113. Commence drilling. K. T. and O. well No. 22. Approved proposal depth for shutting off top water.

A–2. Shutoff. K. T. and O. well No. 30. Tested formations, just above the brown shale. Test satisfactory.

A–3. Shutoff. K. T. and O. well No. 30. Cemented string of casing perforated to locate water sands between the oil sands. This was satisfactorily done and casing plugged.

A–7. Shutoff. K. T. and O. well No. 30. Perforated cemented string opposite oil sand above the water sand. Test showed that these sands were fully protected from water.

Form No. 113. March 1, 1916. Commence drilling well No. 41, K. T. and O. Approved proposed depth for shutting off top water.

SECTION 35, 19–15—Continued.

Form No. 113. February 5, 1916. Commence drilling well No. 42, K. T. and O. Approved proposal depth for shutting off top water.

A–90. Shutoff. K. T. and O. well No. 42. New well test of top water shutoff satisfactory.

Form No. 113. March 11, 1916. Commence drilling well No. 43, K. T. and O. Approved proposal depth for shutting off top water.

A–103. Shutoff. K. T. and O. well No. 43. New well. Top water test satisfactory.

SECTION 36, 19–15.

Letter, September 10, 1915. Standard well No. 1. Redrill. Approved proposed depth of shutting off top water.

Letter, September 17, 1915. Redrill. Standard well No. 1. Approved proposal to shut water off 5′ deeper than original proposal.

A–15. Shutoff. Standard well No. 1. Old well test of water string. Approved recommended drilling to original depth and testing before further deepening, in order to locate possible bottom water.

Letter, September 17, 1915. Abandon. Standard well No. 5. Approved proposed method of abandonment. This approval resulted from several joint conferences had with representatives of the Standard and Shell companies.

Letter, September 25, 1915. Commence drilling. California Oil Fields, Limited, well No. 1. Approved estimated depth of shutting off water.

Letter, December 18, 1915. Depth of shutting off water. Shell Company well No. 1. Proposal approved.

A–38. Shutoff. Shell Company well No. 1. New well. Top water. Test satisfactory.

Letter, April 11, 1916. Commence drilling. Shell Company well No. 2. Proposed depth of water shut off satisfactory.

SECTION 12, 21–14.

AA–185. Abandon. Lubricating Oil Company well No. 1. Approved method of plugging recommended that company determine that each cement plug set properly and furnish this department with record of work for final approval.

AA–186. Abandon. Lubricating Oil Company well No. 2. Approved proposed method of plugging and abandoning.

AA–187. Abandon. Lubricating Oil Company well No. 3. Approved proposal method of plugging and abandoning recommended that that company furnish this department with record of work done in abandoning for final approval.

AA–188. Abandon. Lubricating Oil Company well No. 4. Approved proposed method of abandoning.

AA–189. Abandon. Lubricating Oil Company well No. 5. Approved proposed method of abandoning productive oil sands not encountered. No plugging necessary.

SECTION 8, 17–11.

AA–136. Deepen. Merced Paraffine Oil Company well No. 1. Proposal approved.

SECTION 20, 22–18.

AA–48. Abandon. R. L. Patterson well No. 1. Approved proposal method of plugging and abandoning.

SECTION 13, 24–18.

Commence drilling. Hugh McPhail well No. 1. Approved proposal to prospect for oil sands before sending in estimated depth for shutting off water.

SECTION 22, 25–18.

AA–38. Abandon. Baker and Henshaw well No. 1. Approved proposed method of plugging and abandonment.

AA–39. Abandon. Baker and Henshaw well No. 2. Approved proposal to abandon. This well was not drilled deep enough to encounter oil formations. Recommended that plugging was not necessary.

Section 27, 25–20.

AA–12. Abandon. Borst and Baker well No. 1. Approved proposal to abandon without plugging. No oil formations were encountered in this well according to the data submitted by the company to this department.

Section 2, 25–19.

Notice, April 29, 1916. Drill. Crescent Petroleum Company well No. 1. Approved proposal to prospect for oil formations before giving depth for shutting off water.

Section 3, 26–20.

Letter, March 17, 1916. Removal of derrick. B. B. and E. R. Dudley Petroleum Company well No. 1. Did not approve proposal to move derrick to drill well No. 2. Called attention to fact that work done in plugging No. 1 was not done under the supervision of this department.

AA–178. Shutoff at lower depth. B. B. and E. R. Dudley Petroleum Company well No. 2. Approved proposal to recement in more suitable formation. Recommended that all sands carrying oil below the present depth be thoroughly tested.

AA–194. Cement at 500′. B. B. and E. R. Dudley Petroleum Company well No. 2. Approved proposal to cement 12½″ casing at this depth.

Section 11, 26–20.

Notice, May 24, 1916. Begin drilling. B. B. and E. R. Dudley Petroleum Company well No. 1. Approved proposal depth for shutting off top water.

Section 12, 26–20.

Form No. 113. November 12, 1915. Commence drilling. Baker and Henshaw well No. 1. Approved proposed depth for shutting off top water.

A–70. Shutoff. Baker and Henshaw well No. 1. Test not conclusive. Recommended that additional tests be made later.

Form No. 113. April 11, 1916. Commenced drilling. Baker and Henshaw well No. 2. Proposed depth for shutting off top water not approved. Recommended that water be shut off higher, so that producing sands south in Section 13, be not exposed to possible top water.

AA–172. Test for top water. Baker and Henshaw well No. 2. Approved proposal to put in plug over lower oil sand to test for top water.

AA–205. Shutoff water. Baker and Henshaw well No. 2. Approved proposal to cement in liner, top of which would be in 10″ water string.

Section 13, 26–20.

Letter, December 4, 1915. Commence drilling. Associated Oil Company well No. 12. Requested data on proposed depth of water shut off. This information was not received.

A–30. Shutoff. Associated Oil Company well No. 12. Water test satisfactory.

Form No. 113. January 10, 1916. Commence drilling. Associated Oil Company well No. 13. Proposed depth of water shut off satisfactory.

A–46. Shutoff. Associated Oil Company well No. 13. Water test satisfactory.

Form No. 113. May 27, 1916. Associated Oil Company well No. 14. Commence drilling. Proposed depth of water shut off satisfactory.

A–126. Shutoff. Associated Oil Company well No. 14. Test of water string satisfactory. Supplementary test to be made on production after 60 days from completion.

Form No. 113. May 13, 1916. Commence drilling. Associated Oil Company well No. 15. Proposed depth of water shut off approved.

A–116. Shutoff. Associated Oil Company well No. 15. Test of water string satisfactory.

Form No. 113. December 31, 1915. Commence drilling. Associated Oil Company well No. 16. Proposed depth of water shut off approved.

A–45. Shutoff. Associated Oil Company well No. 16. Water test satisfactory.

Form No. 113. December 26, 1915. Commence drilling. Associated Oil Company well No. 17. Proposed depth of water shut off satisfactory.

Section 13, 26-20—Continued.

A-48. Shutoff. Associated Oil Company well No. 17. Test of water shut off satisfactory.

Form No. 113. December 20, 1915. Commence drilling. Associated Oil Company well No. 18. Proposed depth of water shut off satisfactory.

A-35. Shutoff. Associated Oil Company well No. 18. Test of water shutoff satisfactory.

Form No. 113. March 4, 1916. Commence drilling. Associated Oil Company well No. 19. Proposed depth of water shut off satisfactory.

A-65. Shutoff. Associated well No. 19. Water test satisfactory.

Form No. 113. April 25, 1916. Commence drilling. Associated well No. 20. Proposed depth of water shut off approved.

A-97. Shutoff. Associated well No. 20. Test of water string satisfactory.

Form No. 113. February 6, 1916. Commence drilling. Associated well No. 21. Proposed depth of water shut off approved.

A-55. Shutoff. Associated Oil Company well No. 21. Test of water shut off satisfactory.

Form No. 113. February 1, 1916. Commence drilling. Associated Oil Company well No. 22. Proposed depth of water shut off approved.

A-52. Shutoff. Associated Oil Company well No. 22. Test of water satisfactory.

Form No. 113. February 19, 1916. Commence drilling. Associated well No. 23. Proposed depth of water shut off approved.

A-69. Shutoff. Associated well No. 23. Bailing test showed water was not satisfactorily shut off. Recommended that company carry out their plan and recement at lower depth.

A-74. Shutoff. Associated well No. 23. Test of water satisfactory.

Form No. 113. March 13, 1916. Commence drilling. Associated well No. 24. Proposed depth of water shut off approved.

A-87. Shutoff. Associated Oil Company well No. 24. Test of water shut off satisfactory.

A-85. Shutoff. Associated well No. 24. Test of bottom water shut off not entirely satisfactory. Recommended that well be pumped for further test.

Form No. 113. April 7, 1916. Commence drilling. Associated well No. 25. Proposed depth of water shut off approved.

A-84. Shutoff. Associated well No. 25. Test of water shut off satisfactory.

AA-134. Shutoff bottom water. Associated well No. 25. Proposed work of plugging off bottom water approved.

A-117. Shutoff. Associated well No. 25. Test of bottom water shut off not satisfactory. Recommended that well be pumped for 60 days and 10-hour gauges taken at least once a week, and further recommendation would be made.

Form No. 113. March 17, 1916. Commence drilling. Associated well No. 26. Proposed depth of water shut off approved.

A-81. Shutoff. Associated well No. 26. Test of water shut off satisfactory.

Form No. 113. February 9, 1916. Commence drilling. Associated well No. 27. Proposed depth of water shut off approved.

A-59. Shutoff. Associated well No. 27. Test water shut off satisfactory. Recommended that well be tested after completion to determine whether small amount of water present was drilling water.

Form No. 113. February 14, 1916. Commence drilling. Associated well No. 28. Proposed depth of water shut off approved.

A-62. Shutoff. Associated well No. 28. Water test satisfactory.

Form No. 113. April 23, 1916. Commence drilling. Associated well No. 30. Estimated depth of water shut off approved.

A-98. Shutoff. Associated well No. 30. Test of water shut off satisfactory.

Form No. 113. April 12, 1916. Commence drilling. Associated Oil Company well No. 31. Proposed depth of water shut off approved.

Section 13, 26–20—Continued.

A–94. Shutoff. Associated Oil Company well No. 31. Test of water shut off satisfactory.

Form No. 113. May 6, 1916. Commence drilling. Associated Oil Company well No. 32. Proposed depth of water shut off approved.

A–106. Shutoff. Associated Oil Company well No. 32. Test of water shut off satisfactory.

Form No. 113. June 9, 1916. Commence drilling. Associated Oil Company well No. 33. Estimated depth of water shut off approved.

Form No. 113. June 16, 1916. Commence drilling. Associated well No. 34. Estimated depth of water shut off approved.

Form No. 113. March 4, 1916. Commence drilling. Lost Hills Dev. Company well D-2. Estimated depth of water shut off approved.

A–119. Shutoff. Lost Hills Dev. Company well No. D-2. Test of water shut off not entirely satisfactory. Recommended that well be pumped for 90 days, making monthly determination of water in 10-barrel samples.

Form No. 113. December 30, 1915. Commence drilling. Lost Hills Dev. Company well No. D-3. Estimated depth of water shut off approved.

A–120. Shutoff. Lost Hills Dev. Company well D-3. Test of water shut off not entirely satisfactory. Recommended that company pump well for 90 days making monthly determination of water in 10-barrel samples.

Form No. 113. March 4, 1916. Commence drilling. Lost Hills Dev. Company well No. D-4. Estimated depth of water shut off approved.

A–121. Shutoff. Lost Hills Dev. Company well D-4. Test of water shut off not entirely satisfactory. Recommended that company pump well for 90 days, making monthly determinations of water in 10-barrel samples.

Form No. 113. March 4, 1916. Commence drilling. Lost Hills Dev. Company well No. D-5. Estimated depth of water shut off approved.

A–72. Shutoff. Lost Hills Dev. Company well No. D–5. Water test not entirely satisfactory. Recommend that well be drilled in and pumped for further tests.

Form No. 113. March 7, 1916. Commence drilling. Lost Hills Dev. Company well No. A–4. Estimated depth of water shut off approved.

A–127. Shutoff. Lost Hills Dev. Company well No. A–4. Test of water shutoff satisfactory.

Form No. 113. March 7, 1916. Commence drilling. Lost Hills Dev. Company well No. A-5. Estimated depth of water shut off approved.

A–147. Shutoff. Lost Hills Dev. Company well No. A-5. Test of water shut off not entirely satisfactory. Further tests to be made after well is on pump.

Form No. 113. March 7, 1916. Commence drilling. Lost Hills Dev. Company well No. A-6. Estimated depth of water shut off approved.

A–100. Shutoff. Lost Hills Dev. Company well No. A-6. Test of water string satisfactory, however water should have been shut off above oil sand logged from 538 to 612.

Form No. 113. March 7, 1916. Commence drilling. Lost Hills Dev. Company well No. A–7. Estimated depth of water shut off approved.

A–99. Water shutoff. Lost Hills Dev. Company well A–7. Test of water shut off unsatisfactory. Recommended that results of further tests be submitted before deepening.

A–86. Shutoff. Lost Hills Dev. Company well No. A–7. Test of water shut off unsatisfactory. Recommend well be shut down awaiting results of tests on neighboring wells before cementing deeper.

AA–110. Recement. Lost Hills Dev. Company well No. A–7. Recommend that well stand awaiting tests on adjoining wells.

Form No. 113. November 30, 1915. Commence drilling. B. B. and E. R. Dudley Petroleum Company well No. 2. Estimated depth of water shut off approved.

SECTION 13, 26–20—Continued.

A–95. Shutoff. B. B. and E. R. Dudley Petroleum Company well No. 2. Satisfactory.

AA–100. Redrill. B. B. and E. R. Dudley Petroleum Company well No. 2. Recommended company make another shut off with 10″ casing and use at least 30 sacks of cement.

Letter, April 3, 1916. Dudley and Dudley well No. 2. Test of water shut off unsatisfactory. Recommended that well No. 3 be drilled immediately to locate source of water.

Form No. 113. December 22, 1915. Commence drilling. B. B. and E. R. Dudley Petroleum Company well No. 3. Proposed depth of water shut off approved.

A–82. Shutoff. B. B. and E. R. Dudley Petroleum Company well No. 3. Satisfactory.

AA–128. Shutoff. Bottom water. B. B. and E. R. Dudley Petroleum Company well No. 3. Plugging in bottom approved and recommended that before additional work is done, this department be notified before work is started.

AA–193. Redrill. B. B. and E. R. Dudley Petroleum Company well No. 3. Proposal not approved until additional information is received, including log of well, work previously done and production report.

AA–202. Plug bottom. B. B. and E. R. Dudley Petroleum Company well No. 3. Approved proposal to plug in bottom and recement water string.

Form No. 113. April 2, 1916. Commence drilling. B. B. and E. R. Dudley Petroleum Company well No. 4. Proposed depth of water shut off approved.

Form No. 113. April 7, 1916. Commence drilling. B. B. and E. R. Dudley Petroleum Company well No. 5. Proposed depth of water shut off approved.

Form No. 113. April 17, 1916. Commence drilling. B. B. and E. R. Dudley Petroleum Company well No. 6. Proposed depth of water shut off approved.

A–104. Shutoff. B. B. and E. R. Dudley Petroleum Company well No. 6. Satisfactory.

Form No. 113. May 10, 1916. Commence drilling. B. B. and E. R. Dudley Petroleum Company well No. 7. Proposed depth of water shut off approved in letter of May 25, 1916, after receipt of further information.

A–130. Shutoff. B. B. and E. R. Dudley Petroleum Company well No. 7. Satisfactory.

Form No. 113. May 27, 1916. Commence drilling. B. B. and E. R. Dudley Petroleum Company well No. 8. Proposed depth of water shut off approved.

SECTION 24, 26–20.

Form No. 113. March 7, 1916. Commence drilling. California Star well No. 1. Estimated depth of shutting off water satisfactory.

A–68. Shutoff. California Star well No. 1. Test satisfactory.

AA–169. Bridge over oil sand. California Star well No. 1. Proposal approved. The company desire to shut down this well awaiting results on adjoining wells.

Form No. 113. March 21, 1916. Commence drilling. California Star well No. 2. Estimated depth for shutting off water satisfactory.

A–75. Shutoff. California Star well No. 2. Test approved conditionally. Recommended drilling through the oil sands and pumped for further test of these sands.

AA–116. Test next oil sand. California Star well No. 2. Approved proposal to dril lthrough and test the next oil sand, below 530′.

AA–124. Deepen. California Star well No. 2. Approved proposal to deepen to same depth, stratigraphically, as No. 1 and test well by pumping.

AA–168. Deepen. California Star well No. 2. Approved proposal to deepen well to next sand below 728′ and test the well by pumping.

AA–174. Deepen. California Star well No. 2. Approved proposal to drill through next sand, as the last one passed through made no change in the production of the well.

AA–191. Deepen. California Star well No. 2. Approved proposal to deepen to next sand below 808′. At this depth the well was tested by pumping to determine its water condition. The pumping test proved satisfactory.

SECTION 24, 26–20—Continued.

AA–198. Deepen. California Star well No. 2. Approved proposal to drill to test sand and test by pumping. The company desired definite information as to location of possible bottom water, and tested each sand before entering the next lower one.

Form No. 113. April 13, 1916. Commence drilling. California Star well No. 3. Approved proposal to await results on wells No. 2 and 3 before making decision on depth for shutting off water on this well.

AA–135. Depth of shutting off water. California Star No. 3. Approved estimated depth as proposed.

A–105. Shutoff. California Star No. 3. Test of water shutoff satisfactory.

Form No. 113. Commence drilling. California Star well No. 4. Approved proposal to "spud in" and shut down well awaiting results on adjoining well before furnishing estimate for cementing depth.

Form No. 113. Commence drilling. California Star well No. 5. Estimated depth of shutting off water satisfactory.

Form No. 113. Commence drilling. California Star well No. 9. Approved proposal to "spud in" and shut down awaiting results on adjoining wells before shutting off top water.

Form No. 113. Commence drilling. California well No. 13. Approved proposal waiting results on adjoining wells before company submit final estimate for depth of water shut off.

AA–141. Cement. California Star well No. 13. Approved proposed depth for shutting off top water.

A–109. Shutoff. California Star well No. 13. Test of water shut off satisfactory.

Form No. 113. Commence drilling. California Star well No. 17. Proposed estimated depth for shutting off water satisfactory.

AA–192. Test oil sand. California Star well No. 17. Approved proposal to test tar sands above proposed cementing depth, by pumping. No water was noticed in drilling to these tar sands.

SECTION 19, 26–21.

AA–182. Deepen. Lost Hills Dev. Company well No. A–6. Approved.

AA–173. Deepen. Lost Hills Dev. Company well No. A–7. Approved proposal to deepen to first sand below present depth and test same for bottom water before further deepening.

AA–183. Deepen. Lost Hills Dev. Company well No. A–8. Approved.

AA–200. Deepen. Lost Hills Dev. Company well No. C–6. Approved.

Letter, October 1, 1915. Commence drilling. Lost Hills Dev. Company well No. D–4. Estimated depth of water shut off approved.

A–34. Shutoff. Lost Hills Dev. Company well No. D–4. Satisfactory.

AA–196. Deepen. Lost Hills Dev. Company well No. D–4. Approved.

Letter, October 1, 1915. Commence drilling. Lost Hills Dev. Company well No. D-5. Estimated depth of water shut off approved.

A–27. Shutoff. Lost Hills Dev. Company well No. D–5. Satisfactory.

Letter, October 29, 1915. Commence drilling. Lost Hills Dev. Company well No. D–6. Approved proposal depth for shutting off water.

A–19. Shutoff. Lost Hills Dev. Company well No. D–6. Water test satisfactory. Recommended well be sampled for water at least 3 times a week for next 30 days.

Form No. 113. January 3, 1916. Commence drilling. Lost Hills Dev. Company well D–7. Estimated depth of water shut off approved.

A–63. Shutoff. Lost Hills Dev. Company well No. D–7. Bailing test of water shut off satisfactory. Recommended further pumping test.

SECTION 30, 26–21.

AA–68. Redrill. Universal Oil Company well No. 1. Approved. Recommended shut off at about 500′. The proposal was to test for water by bridging over the oil sand.

A–58. Shutoff. Universal Oil Company well No. 1. Satisfactory. The test proved that the water which the well produced came through the oil sand.

SECTION 34, 26–21.

AA–16. Abandonment. American Oil Fields well No. 3. Method of abandonment approved. No oil formations were encountered in this well.

SECTION 32, 26–21.

AA–8. Redrill. Universal Oil Company well No. 14. Proposal to test water string approved. Proposal to shut off top oil sand to be discussed later.

A–25. Shutoff. Universal Oil Company well No. 14. Satisfactory. The test proved that the water which the well produced came through the oil sand. This may be "edge water."

AA–21. Deepen. Universal Oil Company well No. 14. Proposal to deepen and shut off top oil sand approved.

AA–66. Redrill. Universal Oil Company well No. 15. Approved proposal to pull a portion of the oil string, leaving well finished with a liner.

A–143. Shutoff. Universal Oil Company well No. 16. Satisfactory.

AA–67. Deepen. Universal Oil Company well No. 30. Approved proposal to deepen and shut off top oil sands on account of their water content.

A–83. Shutoff. Universal Oil Company well No. 30. Satisfactory.

AA–139. Deepen. Universal Oil Company well No. 16. Approved proposal to deepen and shut off top oil sand on account of its water content.

Form No. 113. April 21, 1916. Commence drilling. Universal Oil Company well No. 37. Proposed depth of water shut off approved.

A–142. Shutoff. Universal Oil Company well No. 37. Satisfactory.

SECTION 8, 27–19.

Letter, September 27, 1915. Commence drilling. Standard well No. 1. Approved proposal to prospect for oil formations and proper shut off depth.

AA–63. Abandon. Standard well No. 1. Approved proposal to pull the casing. No oil and gas sands reported.

Form No. 113. February 10, 1916. Commence drilling. Well No. 1. The derrick was moved 50′ from original No. 1 and new hole started. Proposal approved.

AA–122. Abandon. Standard well No. 1. Approved proposal to abandon the second hole. The proposal being to move the derrick to start new well on account of condition of hole.

AA–130. Begin drilling. Standard well No. 1. Approved proposal. This being the third hole started. The others were abandoned on account of the condition of the holes.

SECTION 4, 27–21.

AA–145. Redrill. General Petroleum Company well No. 6. Approved proposal. Oil string bad. Unable to clean out to oil sand.

AA–146. Redrill. General Petroleum Company well No. 7. Approved proposal to redrill on account of oil string troubles.

AA–148. Redrill. General Petroleum Company well No. 8. Approved proposal oil string collapsed.

Form No. 113. March 18, 1916. Commence drilling. General Petroleum Company well No. 9–A. Proposed estimated depth of water shut off satisfactory.

A–89. Shutoff. General Petroleum Company well No. 9–A. Test approved.

Form No. 113. March 18, 1916. Commence drilling. General Petroleum Company well No. 10–A. Estimated depth of water shut off satisfactory.

AA–152. Recement. General Petroleum Company well No. 10–A. Approved proposed depth of recementing.

SECTION 4, 27–21—Continued.

A–111. Shutoff. General Petroleum Company well No. 10–A. Top water not shut off. Recommended recementing before drilling into the oil sand.

Form No. 113. December 22, 1915. Commence drilling. General Petroleum Company well No. 16. Proposed estimated depth of water shut off satisfactory.

A–53. Shutoff. General Petroleum Company well No. 16–A. Test of water shut off satisfactory.

AA–153. Deepen. General Petroleum Company well No. 25. Approved proposal to deepen.

Form No. 113. December 23, 1915. Commence drilling. General Petroleum Company well No. 28. Approved estimated depth of water shut off.

A–49. Shutoff. General Petroleum Company well No. 28. Test of water shut off satisfactory.

Form No. 113. February 18, 1916. Commence drilling. General Petroleum Company well No. 26–A. Approved estimated depth of water shut off.

AA–109. Redrill. General Petroleum Company well No. 32. Approved proposal to pull string and redrill sidetracking casing left in hole.

A–92. Shutoff. General Petroleum Company well No. 26. Test of water shut off satisfactory.

Form No. 113. March 18, 1916. Commence drilling. General Petroleum Company well No. 38–A. Approved estimated depth of water shut off.

AA–151. Redrill. General Petroleum Company well No. 38–A. Approved proposal to move derrick about 20′ and drill new hole. The casing parted in the original hole before the water was shut off.

A–145. Shutoff. General Petroleum Company well No. 38–A. Test of water shut off satisfactory.

Form No. 113. June 5, 1916. Commence drilling. General Petroleum Company well No. 43–A. Approved estimated depth of water shut off.

Form No. 113. March 18, 1916. Commence drilling. General Petroleum Company well No. 44–A. Approved estimated depth of water shut off.

A–93. Shutoff. General Petroleum Company well No. 44–A. Test of water shut off satisfactory.

Form No. 113. February 18, 1916. Commence drilling. General Petroleum Company well No. 45–A. Approved proposed depth of water shut off.

A–56. Shutoff. General Petroleum Company well No. 45–A. Test satisfactory.

Form No. 113. June 5, 1916. Commence drilling. General Petroleum Company well No. 49–A. Approved estimated depth of water shut off.

Form No. 113. June 5, 1916. Commence drilling. General Petroleum well No. 50–A. Estimated depth for water shut off.

Form No. 113. March 18, 1916. Commence drilling. General Petroleum Company well No. 51–A. Approved estimated depth of water shut off.

Form No. 113. March 18, 1916. Commence drilling. General Petroleum Company well No. 56–A. Approved estimated depth of water shut off.

A–144. Shutoff. General Petroleum Company well No. 56–A. Test satisfactory.

A–167. Abandon. Standard well No. 21. Work in abandoning was begun before an investigation concerning the proposal could be made. Recommended that company furnish additional information concerning the well.

AA–171. Abandon. Standard well No. 21. The work of abandonment completed but not approved, called for additional information.

AA–177. Concerning abandonment. Standard well No. 21. Approved work done in abandoning this well.

Form No. 113. December 20, 1915. Commence drilling. Standard well No. 51. Approved proposal estimated depth of shutting off water.

A–71. Shutoff. Standard well No. 51. Production test satisfactory.

Form No. 113. February 8, 1916. Commence drilling. Standard well No. 52. Approved proposed estimate depth of shutting off water.

A–64. Shutoff. Standard well No. 52. Satisfactory.

SECTION 4, 27–21—Continued.

Form No. 113. February 8, 1916. Commence drilling. Standard well No. 53. Approved proposed estimated depth of shutting off water.

A–78. Shutoff. Standard well No. 53. Production test satisfactory.

SECTION 5, 27–21.

AA–22. Deepen. Universal Oil Company well No. 7. Proposal to deepen and shut off water approved. The proposal was to shut off oil sands on account of their water content.

A–54. Shutoff. Universal Oil Company well No. 7. Satisfactory.

AA–70. Deepen. B. B. and E. R. Dudley Petroleum Company well No. 1. Approved proposal to shut off the upper oil sands on account of their water content.

A–66. Shutoff. B. B. and E. R. Dudley Petroleum Company well No. 1. Satisfactory.

AA–47. Deepen. B. B. and E. R. Dudley Petroleum Company well No. 4. Approved deepening and recommended water shut off at about 1275′. The proposal was to shut off upper oil sand on account of their water content.

A–57. Shutoff. B. B. and E. R. Dudley Petroleum Company well No. 4. Satisfactory.

Form No. 113. April 10, 1916. B. B. and E. R. Dudley Petroleum Company well No. 5. Commence drilling. Proposed depth of water shut off approved.

A–140. Shutoff. B. B. and E. R. Dudley well No. 5. Satisfactory.

Form No. 113. June 12, 1916. Commence drilling. B. B. and E. R. Dudley Petroleum Company well No. 6. Proposed depth of water shut off approved. Requested logs of wells on Section 5.

AA–91. Deepen. Standard well No. 3. Approved.

AA–96. Redrill and deepen. Standard well No. 7. Proposal to redrill and deepen approved.

AA–147. Redrill. General Petroleum Company well No. 2–B. Approved proposal to redrill on account of collapsed oil string.

Form No. 113. March 18, 1916. Commenced drilling. General Petroleum Company well No. 3–B. Proposed depth of water shut off approved.

Form No. 113. March 18, 1916. Commence drilling. General Petroleum Company well No. 4–B. Proposed depth of water shut off approved.

Form No. 113. June 1, 1916. Commence drilling. Standard Oil Company well No. 10. Proposed depth of water shut off approved.

SECTION 9, 27–21.

Form No. 113. December 7, 1915. Commence drilling. Standard well No. 47. Approval proposed estimated depth of water shut off.

A–33. Shutoff. Standard well No. 47. Satisfactory.

Form No. 113. June 27, 1916. Commence drilling. Standard well No. 50. Approved proposed estimated depth of water shut off.

Form No. 113. March 17, 1916. Commence drilling. D. J. Oil Company well No. 2. Approved proposed estimated depth for shutting off water.

SECTION 17, 27–21.

Letter, September 1, 1915. Drill. Associated Oil Company well No. 1. Proposal satisfactory.

A–17. Shutoff. Associated Oil Company well No. 1. Satisfactory.

A–47. Shutoff. Associated Oil Company well No. 1. Satisfactory.

A–73. Shutoff. Associated Oil Company well No. 1. Satisfactory.

SECTION 22, 27–20.

Letter, November 19, 1915. Drilling. Associated Oil Company well No. 1. Called for information concerning proposed depth of water shut off and estimated depth where producing formations were expected. Received only the well location and date drilling was commenced.

SECTION 27, 27–20.

Commence drilling. Belridge well No 7. After receiving corrected notice for this well the proposed estimated depth of shutting off water was approved.

SECTION 34, 27–20.

Form No. 113. December 15, 1915. Commence drilling Reward Oil Company well No. 1. Proposals satisfactory.

A–76. Shutoff. Reward Oil Company well. Production test approved. The production from this well came from upper formations which were shut off by neighboring wells. This company was well compensated for their efforts in prospecting these upper formations.

AA–129. Deepen. Reward Oil Company well No. 1. Approved proposal to deepen about ten feet.

Form No. 113. May 5, 1916. Commence drilling. Reward Oil Company well No. 2. Proposed estimated depth of shutting off water approved.

Form No. 113. June 16, 1916. Commence drilling. Reward Oil Company well No. 3. Approved proposed estimated depth of shutting off water.

SECTION 35, 27–20.

AA–62. Redrill and deepen. Belridge Oil Company well No. 2. The company was notified that damage probably would result if the upper producing formation were not protected from water, when water was shut off below these formations.

AA–61. Redrill. Belridge Oil Company well No. 4. The proposal made no provision for the protection of the upper oil formations which the company intended to shut off. The attention of the company was called to this fact.

AA–64. Deepen. Belridge Oil Company well No. 5. The proposal made no provision for the protection from water of the upper formation which was the original source of production in the well. The attention of the company was called to the fact that this department had no evidence that the upper formations were ever protected.

A–118. Shutoff. Belridge Oil Company well No. 5. Test showed that water above the cementing point was excluded from formations below this point. Attention was called to decision.

A–37. Shutoff. Belridge Oil Company well No. 6. See correspondence re gas waste, see complaints. Test proved that water above the cementing point was excluded from the formations below.

SECTION 36, 27–20.

Letter, October 15, 1915. Drilling. Standard well No. 1. Proposal satisfactory.

A–18. Shutoff. Standard well No. 1. Test of water shut off satisfactory.

A–60. Shutoff. Standard well No. 1. Test of water string satisfactory. Called attention to fact that possible oil formations above cementing point were probably not protected from water.

AA–111. Cement. Standard well No. 1. Recommended that company shut off water found below the cementing point referred to in decision No. A–60.

AA–195. Test upper formation. Standard well No. 1. Approved proposal to plug bottom of hole and test oil formations referred to in decision No. A–60.

Form No. 113. January 19, 1916. Commence drilling. Union Oil Company well No. 1. Withheld approval of estimated depth of water shutoff, pending neighboring developments approved proposal, however, to cement 12½″ casing to shut off surface water. Late developments in the well proved that the 12½″ casing, cemented at 693′ shut off water above the upper oil formations.

SECTION 33, 28–21.

AA-24. Deepen. Belridge Oil Company well No. 112. Approved proposal to deepen and prospect for lower oil formations.

Letter, March 31, 1916. Belridge Oil Company well No. 112. Called for data concerning the bottom water which was encountered in deepening.

Letter, April 21, 1916. Commence drilling. Belridge Oil Company well No. 408. Called for corrected estimated depth of shutting off water. The original proposal was not satisfactory.

SECTION 2, 29–21.

Form No. 113. June 5, 1916. Commence drilling. General Petroleum Company well No. 32–A. Approved proposed depth for shutting off water.

Form No. 113. June 5, 1916. Commence drilling. General Petroleum Company well No. 56. Approved proposed depth for shutting off water.

SECTION 3, 29–21.

AA–149. Abandon. General Petroleum Company well No. 14. Approved proposed abandonment and recommended that cement be allowed to set below 10″ before plugging in 10″ casing.

AA–143. Abandon. General Petroleum Company well No. 20. Approved proposed method of plugging.

Form No. 113. June 5, 1916. Commence drilling. General Petroleum Company well No. 20–A. Estimated depth of water shut off approved.

Form No. 113. June 5, 1916. Commence drilling. General Petroleum Company well No. 31–A. Estimated depth of water shut off approved.

A–146. Shutoff. General Petroleum Company well No. 31–A. Satisfactory.

Letter, September 20, 1915. Abandon. General Petroleum Company well No. 44.

Letter, September 29, 1915. Abandon. General Petroleum Company well No. 44. Approved proposal to abandon with recommendation that hole be plugged below and into water string, instead of in water string only, also in bottom and between sands as proposed.

A–26. Shutoff. General Petroleum Company well No. 44–A. Satisfactory.

AA–19. Deepen. General Petroleum Company well No. 45. Approved.

AA–108. Abandon. General Petroleum Company well No. 45. Approved proposal to abandon with recommendation that if possible, the 10″ be cut off below the 12½″ and plugged with cement below and into the 12½″ at least 10′.

Form No. 113. May 13, 1916. Commence drilling. General Petroleum Company well No. 45–A. Proposed depth of water shut off approved.

Letter, September 4, 1915. Commence drilling. General Petroleum Company well 47. Proposals approved.

A–50. Shutoff. General Petroleum Company well 45–A. Satisfactory.

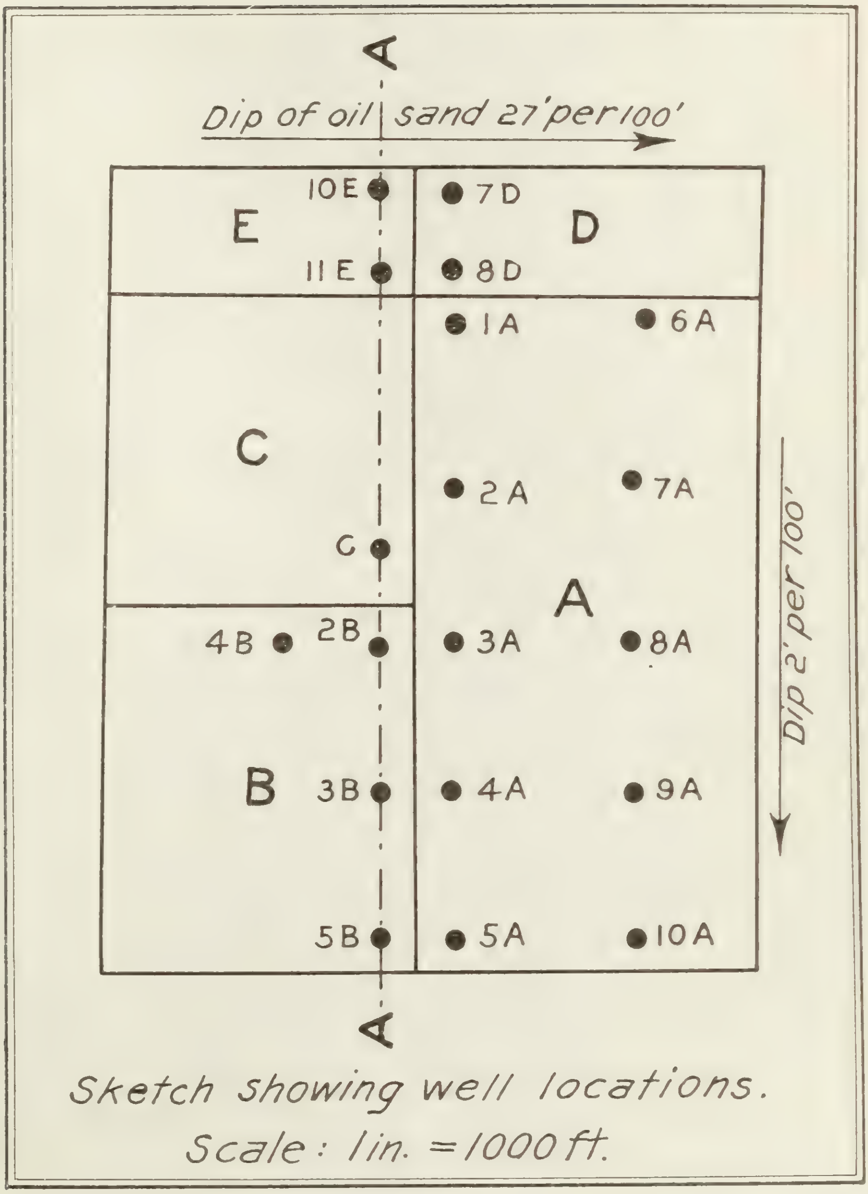
A–9. Shutoff. General Petroleum Company well No. 47. Satisfactory.

METHOD OF USING PRODUCTION RECORDS.

As there are many operators who do not realize the importance of production records and seem to consider them merely as official red tape, it may be well to give an example of how they are used and what they show. The figures are from reports of wells in the Coalinga Field, situated as shown in the following map (Fig. 16), which also shows the dip of the oil-bearing sands.

All of the wells were drilled several years before the period covered by these figures. Some of the dates and figures have been slightly changed from those shown in the original reports, so that it is possible to show the use of records with a limited number of wells and figures. There are, of course, many factors which influence the production of wells which do not show on a production report, such as their physical condition, and these factors must be taken into consideration when dealing with any given problem.

Figure 16



Sketch showing well locations.
Scale: 1 in. = 1000 ft.

The figures appearing on the regular monthly production reports show the total amounts of oil and water produced and the number of days the wells pumped, as follows:

TABLE A.

Production Records Taken from the Monthly Production Reports.

Month	Well No. 1C				Well No. 2B			
	Barrels of clean oil	Barrels of water	Percentage of water	Number days well produced	Barrels of clean oil	Barrels of water	Percentage of water	Number days well produced
August	2,760	240	8.0	31	3,174	26	0.8	31
September	2,659	341	11.0	30	2,754	23	0.8	29
October	1,020	688	40.0	31	2,290	0	0.0	26
November	145	2,755	95.0	30	2,680	0	0.0	30
December	*	*	*	0	2,836	95	3.2	30
January	*	*	*	0	990	810	45.0	30
February	*	*	*	0	228	2,052	90.0	27
March	0.0	2,700	100	27	250	2,250	90.0	31
April	†	†	†	0	150	2,850	95.0	30
May	†	†	†	0	*	*	*	0
June	†	†	†	0	160	2,996	95.0	28

*Redrilling.
†Shut down.

TABLE A—Continued.

Production Records Taken from the Monthly Production Reports.

Month	Well No. 3A				Well No. 2A			
	Barrels of clean oil	Barrels of water	Percentage of water	Number days well produced	Barrels of clean oil	Barrels of water	Percentage of water	Number days well produced
August	3,360	34	1.0	31	1,600	0	0.0	30
September	3,270	33	1.0	29	1,530	0	0.0	30
October	3,484	16	0.5	30	1,687	17	1.0	31
November	3,075	25	0.8	31	1,389	11	0.8	30
December	2,955	45	1.5	30	1,360	10	0.7	30
January	3,458	42	1.2	28	1,096	4	0.4	28
February	2,310	990	30.0	24	988	12	1.2	28
March	760	3,040	80.0	30	1,452	18	1.3	31
April	*	*	*	0	1,503	167	10.0	29
May	*	*	*	0	375	695	65.0	26
June	465	2,635	85.0	20	330	770	70	27

*Redrilling.
†Shut down.

TABLE A—Continued.

Production Records Taken from the Monthly Production Reports.

Month	Well No. 3B				Well No. 4B			
	Barrels of clean oil	Barrels of water	Percentage of water	Number days well produced	Barrels of clean oil	Barrels of water	Percentage of water	Number days well produced
August	3,850	268	6.5	31	3,550	1.0	0.0	31
September	2,290	126	5.2	28	3,320	0	0.0	30
October	2,340	87	3.6	30	3,820	0	0.0	31
November	2,600	72	3.0	30	3,336	34	1.0	30
December	2,806	94	3.2	29	3,285	81	2.4	30
January	2,340	110	4.4	31	2,606	918	26.0	29
February	1,680	420	20.0	28	430	157	30.0	6
March	480	1,920	80.0	27	600	3,400	85.0	27
April	708	2,496	78.0	30	255	3,470	93.2	30
May	260	3,150	90.0	31	257	3,413	93.0	31
June	180	3,220	95.0	29	*	*	*	0

*Redrilling.

The figures when reduced to a common basis of daily production of oil are as follows:

TABLE B.

Average Daily Production of Oil and Water, in Barrels, for Each Producing Day During the Month.

Month	Well No. 1C			Well No. 2 B			Well No. 3B		
	Oil	Water	Total fluid	Oil	Water	Total fluid	Oil	Water	Total fluid
August	89	7.7	96.7	102.0	.09	102.9	124.2	0.0	124.2
September	80.8	11.3	92.1	95.0	0.8	95.8	81.8	4.5	86.3
October	32.9	21.9	54.8	82.0	0.0	82.0	70.8	2.9	73.7
November	4.8	90.2	95.0	89.3	0.0	89.3	80.9	2.6	83.5
December	*	*	0.0	94.5	3.0	97.5	96.7	3.2	99.9
January	*	*	0.0	33.0	27.0	60.0	75.5	3.6	79.1
February	*	*	0.0	8.4	76.0	84.4	60.0	15.0	75.0
March	*	100.0	100.0	8.1	72.6	80.7	17.8	71.0	88.8
April	†	†	0.0	5.0	93.0	98.0	23.6	83.2	106.8
May	†	†	0.0	*	*	0.0	8.4	104.0	112.4
June	†	†	0.0	5.7	107.0	112.7	6.2	111.0	117.2

*Redrilling.
†Shut down.

TABLE B—Continued.

Average Daily Production of Oil and Water, in Barrels, for Each Producing Day During the Month.

Month	Well No. 4B			Well No. 2A			Well No. 1A		
	Oil	Water	Total fluid	Oil	Water	Total fluid	Oil	Water	Total fluid
August	114.5	0.0	114.5	108.3	1.0	109.3	53.3	0.0	53.3
September	110.6	0.0	110.6	113.0	1.0	114.0	51.0	0.0	51.0
October	123.0	0.0	123.0	116.1	0.5	116.6	54.4	0.5	54.9
November	111.2	1.1	112.3	99.2	1.0	100.2	46.3	0.3	46.6
December	109.6	2.6	112.2	98.5	1.5	100.0	45.3	0.3	45.6
January	90.0	31.6	121.6	123.5	1.5	125.0	39.1	0.1	39.2
February	71.7	26.1	87.8	96.2	41.2	137.4	35.3	0.4	35.7
March	29.6	103.0	129.6	25.3	101.3	126.6	47.0	0.6	47.6
April	8.0	115.0	123.0	*	*	0.0	51.8	5.7	57.5
May	8.0	110.0	118.0	*	*	0.0	14.4	26.7	41.1
June	*	*	0.0	23.2	131.0	155.0	12.2	28.1	40.3

*Redrilling.

A careful study of the above figures would reveal many striking features but in order to most clearly bring out their meaning, diagrams are necessary. The diagrams here presented (Figs. 17 and 18) are almost self-explanatory and show that well 1C was the first in the group to produce water, which quickly increased in amount accompanied by an equally rapid decrease in the amount of oil. It will be noted that the other wells in the group later followed a similar course. This indicates that well 1C is the source of the water trouble.

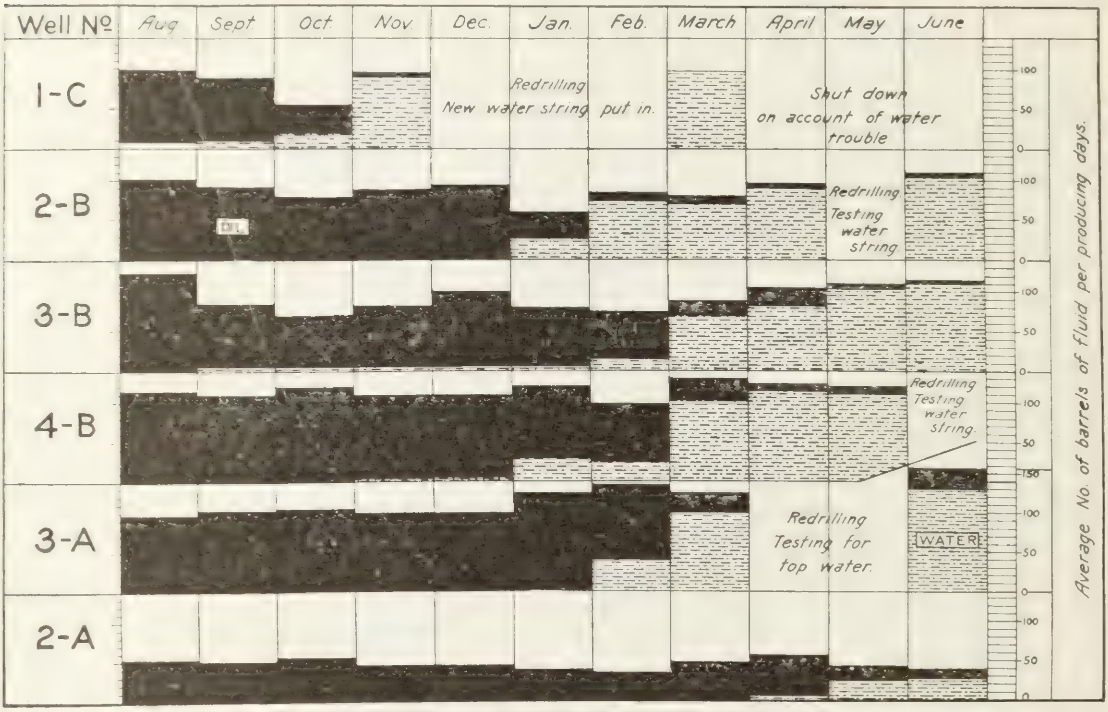


Figure 17 – Diagram showing amounts of oil and water produced by certain wells.

Diagrams based only on the water percentage, such as Fig. 18, can be more easily made and sometimes are sufficient to point out the origin of trouble. However, such a diagram might be misleading for the reason that a well reporting high percentage of water, but making only a small amount of oil, would be given equal prominence on the diagram with a more productive well. It will be readily seen that figures of percentage mean but little unless accompanied by another basic figure which shows the true volume of water. The percentage of water in the wells under consideration shows as follows in a diagram:

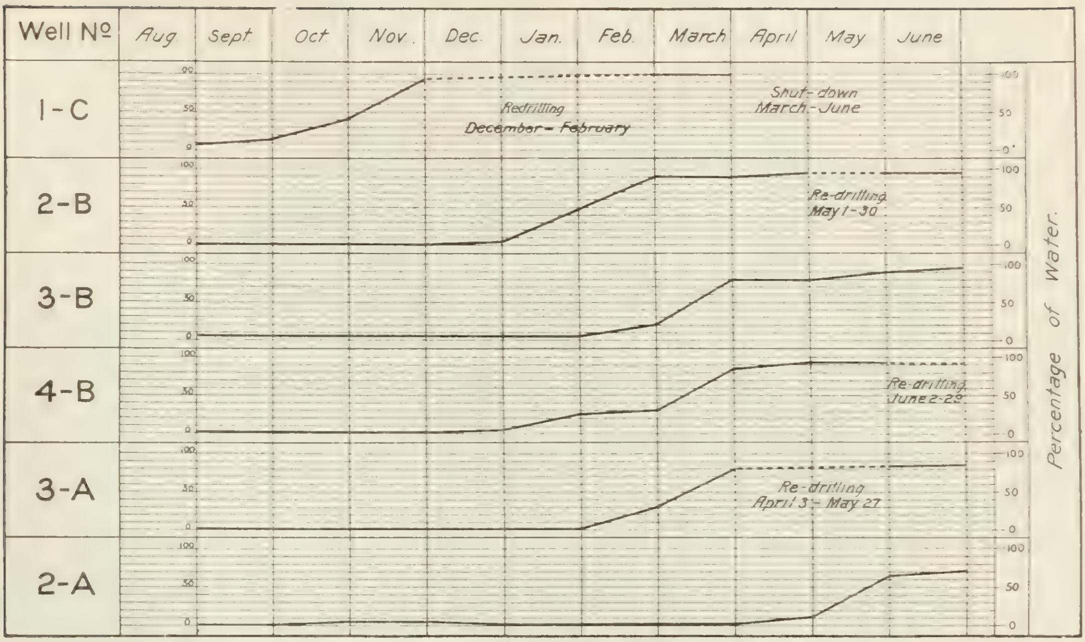
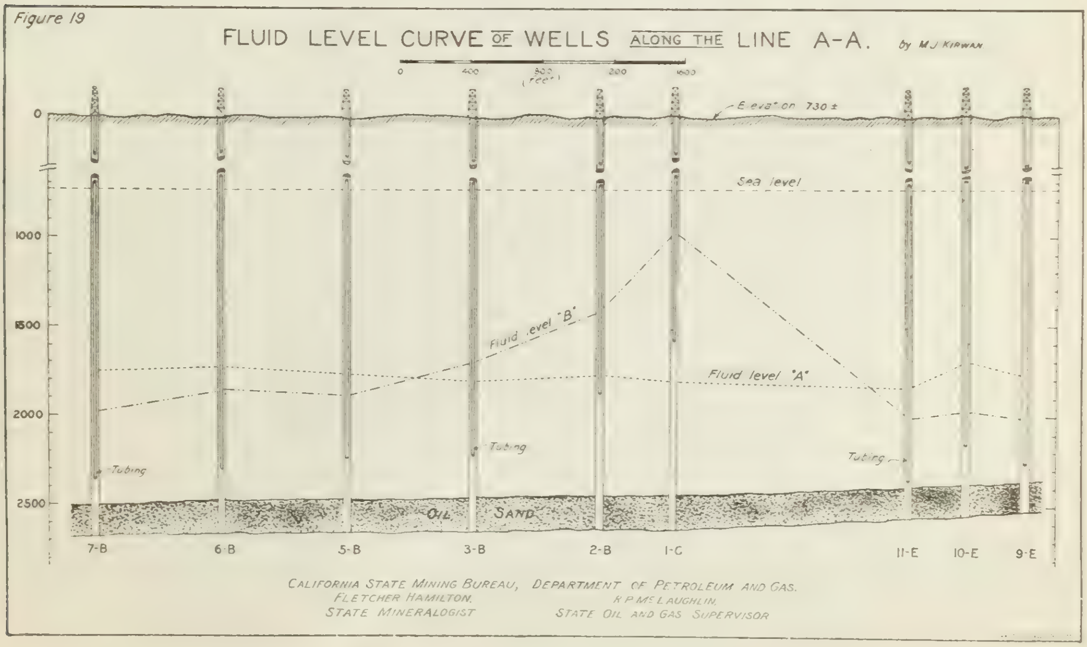


Figure 18 – Diagram showing percentages of water produced by certain wells.

FLUID LEVEL IN WELLS.

The usefulness of recording and comparing the levels to which fluid rises in wells at various times is excellently shown by some of these same wells. The following drawing (Fig. 19) is a cross-section or profile through some of the wells. The dotted line shows the levels at which the fluid stood in the various wells before water trouble developed, while the solid line shows the levels about a year later, when the water trouble was serious. It will be noted that the high fluid level in well 1C points to it as being the source of the water trouble. This is the same conclusion afforded by the figures on production.

Figure 19



CHAPTER III.

MIDWAY-SUNSET, McKITTRICK AND KERN RIVER FIELDS.

By Chester Naramore, Deputy Supervisor.

Organization.

The Taft office of this department was established in September, 1915, by taking over the offices and equipment of the Kern County Oil Protective Association. Mr. E. B. Latham, formerly geologist in charge of the field work of that organization, remained in charge of the work of the Mining Bureau until after the arrival of myself early in October, 1915.

District.

The work assigned to this office included the supervision of the wells of the McKittrick, Midway, Sunset and Kern River oil fields and adjacent territory. The north boundary of the district was later extended to the center of T. 29 S., so as to include the McKittrick Front Development.

General summary.

The work undertaken by this department was not entirely new to many operators of the Midway and Sunset fields. Similar work had been carried on in these two fields through the agency of the Kern County Oil Protective Association. This organization was composed of the representatives of many of the operating companies of these fields. It was managed by a board of directors who appointed a geologist to carry on the active field work, in conjunction with the county water commissioner.

Acknowledgment is here made to the officers of that association for the records collected and the campaign of pioneer education carried on prior to the inauguration of this department.

In beginning the work in this district this office was confronted with many possible lines of procedure, all of value and seemingly each was a pressing necessity for the moment. The first and most apparent work was the testing of water shut offs in drilling wells or in redrilling wells, where the water strings had been disturbed or were failing to exclude the water. This testing automatically demanded a very great deal of time; in fact, it was all, and at times more than one man could properly attend to, as tests would be scheduled in the McKittrick, in the Sunset and in the Kern River fields on the same day.

While this work is relatively important, more beneficial results could have been obtained for the same amount of time involved, by making geological cross-sections graphically showing the formations penetrated by the wells and the casing records of each well. Much time could have been spent investigating formal complaints filed with this department.

For a considerable period, prior to the establishment of this department, the efforts of the field staff of the Kern County Oil Protective Association were concentrated on the construction of the elaborate peg model of the wells of the Midway-Sunset District for exhibition at the Panama-Pacific International Exposition at San Francisco. As a result, there was a very meager supply of cross-sections and no graphic logs were available in the Taft files.

All spare moments have been devoted to constructing these very necessary drawings. Again, instructions from the state oil and gas supervisor have been to use only the information vouched for and furnished by the legally appointed agents of the various companies in making these permanent records. Many sections remain incomplete because of the tardy arrival of company records.

This must not be interpreted as a reflection upon the spirit of the operators towards cooperation with this work, for with a very few exceptions, it has certainly been a pleasure to work with the operators of the fields in this district. Uniformly, the field superintendent has done all within his power to assist in making the best of the handicapped conditions under which we have worked. They have realized that one man could not properly handle the problems of this large district, and have often made allowances for the apparent shortcomings of the deputy in charge.

Likewise the head office representatives have often been most considerate of the circumstances under which this office has operated. One very notable exception was in the Kern River field. Much time was spent in traveling to and from that field to merely witness tests. This time could have been used with a greater profit to all parties concerned.

With the lack of assistance, much more clerical work has of necessity been overlooked, including the acknowledgment of many notices of intention to drill new wells. When feasible, by the use of the telephone, oral authorization has often been given to proceed with certain drilling operations and written confirmation has been forwarded at a later date. In justification of such apparently lax methods, it may be stated that during the period under review, the Mining Bureau Weekly received notice of 485 new wells, 577 tests of water shut off, 113 wells abandoned, and 412 wells redrilled in the state of California. Of these, the Taft office reported 276 new wells, 57 per cent of the total listed; 314 water tests, 50 per cent; 54 wells abandoned, 44 per cent; and 412 redrilling jobs, 45 per cent. A total of 826 entries of work passed on, out of a total of 1587 for the entire state.

To one familiar with such work it is needless to add that very little time could have been devoted to each problem faced, and that the time required to carefully study out the problems involved in 17 odd formal complaints was not available. Many minor informal complaints were received and adjusted incidental to the routine work by bringing the parties interested together for a review of the situation. In most cases an agreement was reached satisfactory to all concerned.

Incidentally it may be of interest to state that occasionally the operator who has registered a complaint against a neighboring well, has been negligent and dilatory about furnishing the department the evidence necessary to support his contention, while the operator complained of has often been very prompt in supplying the data requested of him. This is not a uniform experience but represents one of the difficulties under which we have worked and one for which no good excuse can be offered.

We have aimed to be of service to each and every company in every way compatible with the spirit of the law, and to the limit possible with the equipment available.

In interpreting the problems of the past year we have endeavored to consider them from the point of view of a practical operator, in order that no deviation from customary methods of lease operation might be foisted upon a superintendent except, of course, in the case where there was a likelihood of damage being done to adjoining wells, as in the case of an irregular shut off.

The work in the future should be carried along the same lines, and with the increased force more results can be expected and the fruition of many of the plans started in the past year will be realized.

Witnessing shut off tests.

The testing of the water shut off on some of the wells of the Buena Vista Hills presents a problem because of the heavy gas pressures met with, and the risk of having all of the water blown from the hole, if the fluid level is bailed too low.

Since most of the wells in certain localities have been drilled with the rotary method, little is known of the location and quantity of the top waters. Accordingly, if an operator finds that he can not lower the fluid level below 900 or 1000 feet without risking a blowout, there is no means of determining the value of the test, as the water level outside of the casing may not be high enough to make the test possible. In such cases to date, we have given the operator a temporary approval, contingent upon a ''pumping test'';—more correctly a flowing test, which is made by sampling the oil after the well has produced for 30 or 60 days. Thus far no reversals have been recorded, but it leaves something to be desired as a method of procedure. Other companies insist upon bailing their wells low enough for an efficient test and sometimes have a blowout, but they maintain that it is the only positive way to learn if the shut off is satisfactory before holing into the oil measures.

The question of just what constitutes a satisfactory test of a water shut off is many sided, and has many advocates for and against each separate phase of the procedure, but all seem to agree upon the essentials, if not upon the details of the work as carried on by this department. Of necessity, like some other oil country methods of reasoning, the point of view is often greatly influenced by the superintendent's work in hand, and not from impartial engineering facts.

No set rules or approval methods of procedure can be made to apply to all wells, and the inspector must consider the test of each well as a separate problem.

COMPLAINTS.

During the past fiscal year the following 12 formal complaints have been made to the Taft office of this bureau.

Complaint No. 1. October 9, 1915.

Sunset Monarch Oil Company, Section 26, 12–24,

vs.

American Oil Fields Company, Ltd., Section 32, 32–24, wells No. 5 and No. 6.

The Sunset Monarch Oil Company, on October 9, 1915, sent this department a formal complaint of the condition of the American Oil Fields Company's wells No. 5 and No. 6 on Section 32, 32–24. The matter was taken up with the latter company by letter and by conference.

On December 1, 1915, the American Oil Fields Company made a written proposal to "redrill and shut off water in well No. 5." Work was started and the crew drilled through the pipe high up the hole. Work was suspended, and the management reported that the casing had been eaten out by the action of the water. The matter was again taken up in June, 1916. No results have been obtained to date.

Complaint No. 2. November 30, 1915.

Brad Oil Company, Section 15, 32–23,

vs.

Consolidated Midway Chief Oil Company, Section 15, 32–23. Well No. 2.

November 30, 1915, the superintendent of the Brad Oil Company made a complaint of the manner in which the Consolidated Midway Chief Oil Company's No. 2 well was being abandoned. This department immediately waited upon the latter company's superintendent in charge of the work, and was assured that they were not abandoning the well, and that they would confer with this department before starting any such work.

They later sold the wells and all surface improvements to a wrecking firm. This concern started immediately to abandon the well No. 2 without taking note of its condition or reporting the proposed work to this department. We caused the work to be halted and, after a regular proposal to abandon the well had been received from the wrecking company, caused them to redrill the well to the original bottom. After shooting the holes together, cement was dumped in the bottom and brought up to the shoe of the old water string. The shut off was then tested and approved. The casing was shot again above the top oil zone and below the top water, and a cement plug placed at this point.

Complaint No. 3. November 30, 1915. (Verbal.) February 21, 1916.

Canadian Pacific Oil Company, Section 4, 32–23,

vs.

Alaska Pioneer Oil Company, Section 31, 31–23. Well No. 6.

The Canadian Pacific Oil Company, operating on Section 4, 32–23, reported an increase of water up to 54 per cent in the oil from their No. 1 well and complained that the water was being let in from the No. 6 well of the Alaska Pioneer Oil Company, contending that the Alaska Pioneer well had been drilled into bottom water and never properly shut off prior to the abandonment of the well.

A conference was held in this office at which the superintendent of each property was present. Mr. McGilvray, representing the Alaska Pioneer Company, contended that the well in question had been properly abandoned and that all oil sand had been protected. No definite conclusion was reached and other possible sources of water should be investigated before any semblance of a decision can be rendered.

Complaint No. 4. November 11, 1915.

Traders Oil Company, Section 23, 32–23,

vs.

Indian Colonial Development Company, Section 22, 32–23. General complaint.

The Traders Oil Company filed a general complaint against the wells of the Indian and Colonial Development Company, on Sections 22, 32–23, and 23, 32–23, without specifying individual wells, maintaining that the wells had made water for some time, even when pumped 24 hours per day; and that since the Indian and Colonial Company had commenced to pump their wells only at intervals, the water had accumulated and was flooding the wells of the Traders property.

The management of the Indian and Colonial Company offered to meet the situation in any way recommended by this department, as they also were anxious to correct the water troubles if possible, having already expended some $75,000.00 on this work without definite result.

All parties concerned were requested to furnish this department logs and production figures with water content if possible, that the problem might be approached from every angle.

In the meantime in drilling a new well, No. 106, the Traders Oil Company located an intermediate water between the upper and lower oil horizons, as described in the note on Section 22. This discovery may lead to the solution of this very perplexing problem.

This department has made graphic logs of many of the wells involved; has constructed a few sections and hopes to have all the desired sections available soon.

Complaint No. 5. November 17, 1915.

Kern Trading and Oil Company, Section 31, 12–23,
vs.
National Pacific Oil Company, Section 30, 12–23. Well No. 1.

The Kern Trading and Oil Company in complaining against the condition of the No. 1 well of the National Pacific Oil Company, on fractional section 30, 12–23, admitted that their off-set well No. 35, on Section 31, 12–23, was also a water well and suggested plugging the bottom of each to protect the sands from further damage. No results were obtained because of the lack of cooperation on the part of the receiver, Howard M. Payne.

Complaint No. 6. January 21, 1916.

Rock Oil Company, Section 23, 31–22,
vs.
San Francisco Midway Oil Company, Section 24, 30–22. Wells No. 2 and No. 3.

In January, 1916, the Rock Oil Company, Section 23, 31–22, complained of the condition of two unfinished wells belonging to the San Francisco Midway Oil Company, Nos. 2 and 3, Section 24, 31–22. After securing the necessary data and drawing up the sections, the complaint was placed before the San Francisco Midway Oil Company. The president of this company under date of May 5, 1916, agreed to make another effort to shut off the water in No. 2 well and to complete well No. 3.

Work had not been started up to July 1, 1916.

Complaint No. 7. February 14, 1916.

Pacific Crude Oil Company, Section 32, 31–23,

vs.

Buick Oil Company, Section 32, 31–23. Well No. 3.

On February 14, 1916, the Pacific Crude Oil Company filed a complaint against the water condition in well No. 3 of the Buick Oil Company, Section 32, 31–23. They contend that in this well the water string was landed above a top water sand, and that the oil string was carried into bottom water, making it a double menace to the surrounding wells in this gusher district. This well is probably doing as much damage as any well in the Midway field.

This well is in the hands of the receiver, H. M. Payne.

No remedial work has been attempted.

Complaint No. 8. February 19, 1916.

Nacirema Oil Company, Section 6, 30–22,

vs.

United States Oil and Mining Company, Section 6, 30–22. Wells No. 2, No. 3 and No. 4.

The superintendent of the Nacirema Oil Company called at this office on February 19, 1916, to make complaint of the water conditions in wells No. 2, No. 3 and No. 4 of the United States Oil and Mining Company, Section 6, 30–22, on the McKittrick Front. No definite information has as yet been received of the facts concerning these wells.

Complaint No. 9. February 25, 1916.

Fairbanks Oil Company, Section 26, 32–23,

vs.

General Petroleum Company, Section 26, 32–23. "Sibyl" well No. 1.

The Fairbanks Oil Company on February 25, 1916, complained to this department that their No. 2 well, on Section 22, 31–23, was being damaged by water from well No. 1, of the Sibyl lease of the General Petroleum Company, which they contend was improperly abandoned. The matter was immediately taken up with the local management of the General Petroleum Company, and on February 28th the superintendent and resident geologist called at this office with graphic logs and office records giving the details of the abandonment of No. 1 well. The driller, who stripped the casing from the well months after the well was plugged, made a statement to this department that the well was dry at that time. It was concluded that the water found in the Fairbanks No. 2 well did not come from the Sibyl No. 1.

Complaint No. 10 was withdrawn.

Complaint No. 11. March 30, 1916.

Hale-McLeod Oil Company and *Midway Five Oil Company,* Section 5, 32–23,
vs.
Kalispel Oil Company, Section 5, 32–23. Well No. 2.

On March 29, 1916, the Hale-McLeod Oil Company, acting for the Midway Five Oil Company, made a formal complaint against the existing water conditions in the No. 2 well of the Kalispel Oil Company. All three companies operate on Section 5, 32–23. No definite data accompanied the complaint. Since that date this office has drawn sections and compiled as much data as possible relative to the water situation on the SW. $\frac{1}{4}$ of Section 5. The findings to date lead us to think that all three companies have offending wells and much remedial work must be undertaken to better conditions if a profitable oil yield is to be won from this territory for a much longer period. The records of three important wells have just been received and will be added to the drawings as soon as possible.

Complaint No. 12. April 3, 1916.

Midway Royal Petroleum Company, Section 19, 31–23,
vs.
Brookshire Oil Company, Section 24, 31–22. Wells No. 6 and No. 7.

The Midway Royal Petroleum Company, Section 19, 31–23, under date of April 15, 1916, made complaint against the water conditions in the No. 6 and No. 7 wells of the Brookshire Oil Company, Section 24, 31–22. The contention was that the Brookshire Company had been pumping 24 hours per day until about October 1st, when they began pumping daylight tours only, and that very shortly after the change, the water in the Midway Royal well increased from 8 per cent to 21 per cent.

The deputy made a trip to the property and noted the behavior of wells No. 6 and No. 7, both of which delivered into one tank. But very little free water was found in this tank. A request was made to see any record kept by the superintendent. The books were promptly placed at his disposal. It was noted that the cuts ranged from 2.2 per cent to 3 per cent, and that water drawn from the tank gauged 11 inches, or 40.25 barrels in ten days; four barrels per day. This was not deemed a dangerous condition and plans were made to make further tests, but time has not been available to do so.

Complaint No. 13. June 28, 1916.

Stockton Midway Oil Company, Section 14, 31–22,

vs.

Onisbo Oil Company, Section 14, 31–22. Well No. 1.

Formal complaint was made June 26, 1916, by the Stockton Midway Oil Company against the No. 1 well of the Onisbo Oil Company, Section 14, 31–22. Complaint contended that in this well the water string was landed 100 feet above the water sand. The well has not been pumped for two years and is presumably flooding the territory.

The complaint is being taken up with the Onisbo Oil Company.

INFORMAL COMPLAINTS.

The Alaska Pioneer Oil Company complained to this department in September, 1915, that well No. 8 of the C. C. M. O. Company, on Section 31, 31–23, was letting water into their No. 1 well. Acting on the complaint the C. C. M. O. Company redrilled the well and shut off the water. Shutoff was tested and approved by this department.

The Kalispel Oil Company, on October 21, 1915, made complaint to this department that through the medium of improper shutoffs, the Kern Trading and Oil Company and the St. Lawrence Oil Company were flooding their upper oil horizon. It was shown that the wells involved had made double shutoffs to protect the sands in question. This complaint has been merged with complaint No. 11 in a general study of the water condition in this section.

On November 4, 1916, Mr. F. B. Chapin, acting for the Consolidated Mutual Oil Company, made an informal complaint of the water conditions in the No. 1 well of the Record Oil Company.

The work of this department in each oil field of the district served by the Taft office is briefly reviewed in the following notes, and a list is given of the wells passed on in each section. For convenience the fields are considered in the following order: Midway, Sunset, Kern River and McKittrick.

MIDWAY FIELD.

In carrying on the work of this office it has been necessary to assume more or less arbitrary boundaries between the McKittrick and Midway and between the Midway and Sunset fields, as in reality they merge into one long field. The Midway field is here considered to include all of Townships 31, 22; 31, 23; 31, 24; 32, 23 and 32, 24, and Sections 1, 32–22. This includes the Buena Vista Hills and the Elk Hills.

This field includes more than double the proven acreage of any other field in California and is the source of more than two-fifths of the total production of the state each month. In addition it has great gas resources.

During the period under review, in the Midway field there were 155 new wells started; 165 tests were made of water shutoffs; 33 wells were deepened; 46 were redrilled, and 29 were abandoned; a total of 428 wells worked, representing about 27 per cent of all work done in California. Nearly one-third of the new wells and tests of the state were registered from this one field. Notes of interest concerning the new work will be found following the list of wells passed on by the department.

List of Wells Passed on the Midway Field Including Townships 31–22; 31–23; 31–24; 32–22; 32–23 and 32–24.

(Figures DD–77, etc., refer to report number.)

SECTION 2, 31–22.

June 10, 1916. Drill. J. E. O'Donnel lease well No. 1. This lease consists of the E. ½ of the NE. ¼ of Section 2; eighty acres.

SECTION 3, 31–22.

May 15, 1916. Drill. J. E. O'Donnel lease well No. 1. (Large gas well at 850 feet.)

June 5, 1916. Drill. J. E. O'Donnel lease well No. 2.

SECTION 14, 31–22.

DD–77. Redrill. Combined Oil Company well No. 5.

D–209. Shutoff. Alberta Midway Oil Company well No. 15.

Form No. 113. April 12, 1916. Drill. Alberta Midway Oil Company well No. 15.

Form April 11, 1916. Drill. Alberta Midway Oil Company well No. 14.

D–223. Shutoff. Alberta Midway well No. 14.

SECTION 15, 31–22.

DD–177. Redrill. Bankline Oil Company well No. 2.

Letter, September 15, 1915. Shutoff. General Petroleum Company well No. 28.

DD–161. Redrill. Dominion Oil Company well No. 1. October 14, 1915, drill, General Petroleum Company, new well No. 29.

D–5. Shutoff. General Petroleum Company well No. 29. November 10, 1915, drill, General Petroleum Company well No. 30.

D–19. General Petroleum Company well No. 30, shutoff. April 30, 1916, drill, General Petroleum Company well No. 31.

D–162. Shutoff. General Petroleum Company well No. 31. April 30, 1916, drill, General Petroleum Company well No. 32. December 31, 1915, drill, General Petroleum Company well No. 33.

D–70. Shutoff. General Petroleum Company well No. 33.

Letter, September 30, 1915. Drill. General Petroleum Company well No. 34.

Letter, October 27, 1915. Shutoff. General Petroleum Company well No. 34. February 16, 1916. Drill. General Petroleum Company well No. 35.

D–89. Shutoff. General Petroleum Company well No. 35.

Letter, September 4, 1915, drill, General Petroleum Company well No. 36. December 1, 1915, drill, General Petroleum Company well No. 37.

D–47. Shutoff. General Petroleum Company well No. 37. March 3, 1916, drill, General Petroleum Company well No. 38.

D–117. Shutoff. General Petroleum Company well No. 38.

Notice, June 12, 1916. Drill. Hondo Oil Company well No. 11.

Letter, September 29, 1915. Shutoff. K. T. and O. well No. 3.

DD–184. Redrill and deepen. Midway Peerless Oil Company well No. 4.

Letter, September 15, 1915. Abandon. Potter Oil Company well No. 2. (Old No. 2.)

SECTION 15, 31–32—Continued.

D–6. Shutoff, Potter Oil Company well No. 2. May 2, 1916, drill, Potter Oil Company No. 17; 15, 31–22.

D–164. Shutoff, Potter Oil Company well No. 17.

Form No. 113. April 14, 1916. Drill, Potter Oil Company well No. 18.

D–141. Shutoff, Potter Oil Company well No. 18. January 14, 1916, drill, Potter Oil Company well No. 20.

D–85. Shutoff, Potter Oil Company well No. 20. June 3, 1916, drill, Potter Oil Company well No. 21.

D–227. Shutoff, Potter Oil Company well No. 21. May 22, 1916, drill, Potter Oil Company well 22.

D–195. Shutoff, Potter Oil Company well No. 22. March 24, 1916, drill, Potter Oil Company well No. 23.

D–134. Shutoff, Potter Oil Company well No. 23. March 14, 1916, drill, Potter Oil Company well No. 24.

D–100. Shutoff, Potter Oil Company well No. 24.

DD–180. Redrill and deepen, Security Development Company well No. 7.

DD–206. Redrill, Security Development Company well No. 9.

SECTION 21, 32–22.

DD–136. Abandon, State Oil Company well No. 2.

D–143. Shutoff, State Consolidated Oil Company well No. 2.

SECTION 23, 31–22.

November 10, 1915. Drill, General Petroleum Company well No. 10–B.

D–41. Shutoff, General Petroleum Company well No. 10–B.

Form No. 113. April 12, 1916. Drill, General Petroleum Company wells No. 12–B and No. 13–B.

DD–159. Shutoff bottom water, Tumbador Oil Company well No. 6.

SECTION 24, 31–22.

Form No. 113. May 9, 1916. San Francisco Midway Oil Company. Notice to commence shutting off water wells No. 2 and No. 3.

SECTION 26, 31–22.

December 11, 1915. Drill, California Star Oil Company well No. 14.

D–38. Shutoff. California Star Oil Company well No. 4. December 11, 1915, drill, California Star Oil Company well No. 5.

D–61. Shutoff, California Star Oil Company well No. 5.

D–7. Shutoff, Dabney Oil Company well No. 10.

Letter, September 21, 1915. Drill, General Petroleum Company well No. 12.

D–14. Shutoff, General Petroleum Company well No. 12–B. September 30, 1915. Drill, General Petroleum Company well No. 13–A.

D–23. Shutoff, General Petroleum Company well No. 13–A.

Letter, March 28, 1916. Water conditions, General Petroleum Company well No. 13.

DD–187. Redrill. General Petroleum Company well No. 13–A. December 31, 1915. Drill, General Petroleum Company well No. 14–A.

D–104. Shutoff, General Petroleum Company well No. 14–A.

DD–186. Redrill, General Petroleum Company well No. 14–A. December 31, 1915. General Petroleum Company well No. 15–A.

D–176. Shutoff, General Petroleum Company well No. 15–A. January 20, 1916. Drill, General Petroleum Company well No. 23–A.

SECTION 19, 31–23.

April 4, 1916. Drill, Union Oil Company, Midway Royal No. 2 well.

D–229. Shutoff, Union Oil Company well Midway Royal No. 2.

SECTION 35, 31–22.

January 5, 1916. Drill, Associated Oil Company well No. 23.

D–58. Shutoff, Associated Oil Company well No. 23.

Form No. 113. December 8, 1915. Drill, Associated Oil Company well No. 24.

SECTION 35, 31–22—Continued.

D–39. Shutoff, Associated Oil Company well No. 24.

Form No. 113. December 8, 1915. Drill, Associated Oil Company well No. 25.

D–37. Shutoff, Associated Oil Company well No. 25.

Form No. 113. December 20, 1915. Drill, Associated Oil Company well No. 33.

D–54. Shutoff, Associated Oil Company well No. 33.

DD–139. Redrill, Associated well No. 33. December 20, 1915. Drill, Associated Oil Company well No. 34.

D–53. Shutoff, Associated Oil Company well No. 34. January 5, 1916. Drill, Associated Oil Company well No. 35.

D–79. Shutoff, Associated Oil Company well No. 35.

Form No. 113. November 15, 1915. Drill, Associated Oil Company well No. 41.

D–18. Shutoff, Associated Oil Company well No. 41.

Form No. 113. November 26, 1915. Drill, Associated Oil Company well No. 42.

D–31. Shutoff, Associated Oil Company well No. 42.

DD–91. Redrill oil string, Associated Oil Company well No. 42.

Form No. 113. November 15, 1915. Associated Oil Company well No. 43.

D–25. Shutoff, Associated Oil Company well No. 43. March 27, 1916. Drill, Associated Oil Company well No. 44.

D–119. Shutoff, Associated Oil Company well No. 44. May 3, 1916. Drill, Associated Oil Company well No. 45.

D–203. Shutoff, Associated Oil Company well No. 45.

Letter, November 3, 1915. Drill, Associated Oil Company well No. 52.

D–13. Shutoff, Associated Oil Company well No. 52. April 7, 1916. Drill, Associated Oil Company well No. 53.

D–139. Shutoff, Associated Oil Company well No. 53.

SECTION 20, 31–23.

Letter, October 6, 1915. Drilling, Associated Oil Company well No. 3. (New No. 72.)

DD–28. Drilling, Associated Oil Company well No. 3.

DD–67. Redrill and deepen, Associated Oil Company well No. 3.

D–50. Shutoff, Associated Oil Company well No. 3.

D–86. Shutoff, Associated Oil Company well No. 3.

DD–116. Abandon lower part, Associated Oil Company well No. 3.

SECTION 21, 31–23.

Letter, June 12, 1916. Drilling, well No. 14, K. T. and O.

SECTION 22, 31–23.

Letter, September 16, 1915. Redrill and deepen, Associated Oil Company well No. 3.

DD–48. Redrill and deepen. Associated Oil Company well No. 3.

Letter, September 4, 1915. Shutoff, Associated Oil Company well No. 32. (Old No. 7.)

Form No. 113. April 10, 1916. Drill, Associated well No. 8. (New No. 33.)

DD–205. Omit test, Associated well No. 33. (Old No. 8.)

D–235. Shutoff, Associated well No. 8. (New No. 33.)

DD–9. Abandon, Associated well No. 5. (New No. 43.)

DD–96. Deepen, Standard well No. 1.

DD–170. Deepen, Standard well No. 5.

D–177. Shutoff, Standard well No. 10.

D–175. Omitting test, Associated well No. 8.

SECTION 25, 31–23.

February 10, 1916. Drill, K. T. and O. Company well No. 11.

D–211. Shutoff, K. T. and O. Company well No. 11. February 10, 1916. Drill, K. T. and O. Company well No. 12.

D–189. Shutoff, K. T. and O. Company well No. 12. June 26, 1916. Drill, K. T. and O. Company well No. 13. May 2, 1916. Drill, K. T. and O. Company well No. 10.

SECTION 26, 31–23.

Letter, December 21, 1915. Drill, Associated well No. 1. (Old No. 9.)
Letter, January 5, 1915. Drill, Associated well No. 6. (Old No. 9.)
DD–107. Drill, Associated well No. 23. (Old No. 12.)
DD–137. Drill, Associated well No. 23. (Old No. 12.)
D–146. Shutoff, Associated well No. 23. (Old No. 12.)
Letter, September 4, 1915. Drill, Associated well No. 24. (Old No. 7.)
DD–84. Drill, Associated well No. 33. (Old No. 11.)
DD–115. Drill, Associated well No. 33. (Old No. 11.)
D–123. Shutoff, Associated well No. 33. (Old No. 11.)
DD–47. Drill, Associated well No. 34. (Old No. 10.)
Letter, September 4, 1915. Shutoff, Associated well No. 42. (Old No. 6.)
Letter, September 22, 1915. Drill, Associated well No. 53. (Old No. 8.)
D–17. Shutoff, Associated well No. 53. (Old No. 8.)
D–36. Shutoff, Associated well No. 53. (Old No. 8.)
Form No. 113. April 25, 1916. Drill, Associated well No. 63. (Old No. 13.)
D–176. Test 12½″ casing, Associated well No. 63. (Old No. 13.)
D–23. Shutoff, Associated well No. 63. (Old No. 13.)
Form No. 113. Drill, Associated Oil Company well No. 83.
DD–210. Test 12½″ casing, Associated well No. 83. (Old No. 14.)
DD–44. Redrill and deepen, Standard well No. 1.
DD–43. Redrill, Standard well No. 8.
D–118. Shutoff, Standard well No. 11. April 4, 1916. Drill, Standard Oil Company well No. 12. April 4, 1916. Drill, Standard Oil Company well No. 13.
D–167. Shutoff, Standard well No. 13.

SECTION 28, 31–23.

Letters re Standard Oil Company well No. 3, Columbus lease.
D–2. Shutoff, Consolidated Mutual Oil Company well No. 11.
DD–2. Deepen, Consolidated Mutual well No. 11.
D–30. Shutoff, Consolidated Mutual well No. 11. (See various other correspondence *re* this section.)

SECTION 30, 31–23.

Letter, September 3, 1915. Redrill, Pioneer Midway well No. 2.
Letter, October 13, 1915. Shutoff, Pioneer Midway well No. 2.

SECTION 31, 31–23.

December 2, 1915. Drill, Eagle Creek well No. 11.
D–67. Shutoff, Eagle Creek Company well No. 11. May, 26, 1916. Drill, Eagle Creek well No. 12.
Letter, September 11, 1915. Abandon, Mammoth Oil Company well No. 3. October 22, 1916. Drill, Mammoth Oil Company well No. 6.
D–20. Shutoff, Consolidated Mutual Oil Company well No. 6.
D–27. Shutoff, Consolidated Mutual Oil Company well No. 6.
D–168. Shutoff, C. C. M. O. Company well No. 8.

SECTION 32, 31–23.

Letter, September 7, 1915. Deepen, Alaska Pioneer well No. 1.
DD–114. Abandon, California Midway well No. 2. May 5, 1916. Drill, California Midway Oil Company well No. 10. Letter, September 10, 1915. Abandon, Olig Crude well No. 1. November 26, 1915. Drill, Olig Crude Oil Company well No. 5.
D–69. Shutoff, Olig Crude well No. 5.
DD–113. Shutoff bottom water, Pacific Crude well No. 4.
D–174. Shutoff, Pacific Crude well No. 4.
DD–181. Abandon, Pacific Crude well No. 4.

SECTION 33, 31–23.

DD–26. Abandon, K. T. and O. Company well No. 22.

D–24. Shutoff, K. T. and O. well No. 9.

SECTION 34, 31–23.

DD–15. Abandon, Associated well No. 31. (Old No. 4.)

DD–196. Deepen, Associated well No. 74. (Old No. 9.)

DD–14. Deepen, Associated well No. 83. (Old No. 6.)

DD–199. Drill, Associated well No. 91. (Old No. 10.)

DD–211. Omit test of shutoff, Associated well No. 91.

DD–197. Deepen, Associated well No. 96. (Old No. 3.)

DD–31. Redrill and deepen, Union Oil Company well No. 6.

DD–178. Deepen, Union well No. 8.

DD–134. Deepen, Union well No. 9.

SECTION 35, 31–23.

February 10, 1916. Drill, K. T. and O. Company well No. 30.

D–101. Shutoff, K. T. and O. Company well No. 30. February 10, 1916. Drill, K. T. and O. Company well No. 28.

D–111. Shutoff, K. T. and O. Company well No. 28.

SECTION 36, 31–23.

DD–193. Redrill and deepen, Standard well No. 3.

DD–194. Redrill and deepen, Standard well No. 4.

D–22. Shutoff, Standard well No. 18.

DD–109. Redrill and deepen, Standard well No. 18.

DD–18. Redrill and deepen, Standard well No. 26.

DD–11. Redrill and deepen, Standard well No. 26.

D–226. Shutoff, Standard well No. 26. Letters, Shutoff, Standard well No. 31.

Report, August 27, 1915. Shutoff, Standard well No. 31. (Signed Kirwan.) Letter, September 16, 1915. Shutoff, Standard well No. 32. September 14, 1915. Drill, Standard Oil Company well No. 33.

D–78. Shutoff, Standard well No. 35. October 13, 1915. Drill, Standard Oil Company well No. 34.

D–66. Shutoff, Standard well No. 34. March 17, 1916. Drill, Standard Oil Company well No. 35.

D–172. Shutoff, Standard well No. 35. January 24, 1916. Drill, Standard Oil Company well No. 36.

D–103. Shutoff, Standard well No. 36. January 24, 1916. Drill, Standard Oil Company well No. 36.

D–197. Shutoff, Standard well No. 36. February 21, 1916. Drill, Standard Oil Company well No. 37.

D–147. Shutoff, Standard well No. 37. April 4, 1916. Drill, Standard Oil Company well No. 38. March 17, 1916. Drill, Standard Oil Company well No. 39.

D–165. Shutoff, Standard well No. 39. April 4, 1916. Drill, Standard Oil Company well 41.

D–210. Shutoff, Standard well No. 41. May 10, 1916. Drill, Standard Oil Company well No. 42.

SECTION 10, 31–24.

DD–23. Abandon, General Petroleum Company well No. 1.

SECTION 1, 32–22. (San Luis Obispo County.)

May 1, 1916. Drill, C. C. M. O. Company well No. 15.

D–175. Shutoff, C. C. M. O. Company well No. 15.

May 1, 1916. Drill, C. C. M. O. Company well No. 16.

June 30, 1916. Drill, C. C. M. O. Company well No. 17.

June 30, 1916. Drill, C. C. M. O. Company well No. 18.

June 30, 1916. Drill, C. C. M. O. Company well No. 19.

SECTION 1, 32–23.
June 26, 1916. Drill, K. T. and O. Company well No. 32.
June 8, 1916. Drill, K. T. and O. Company well No. 34.
D–212. Shutoff, K. T. and O. Company well No. 34.
February 14, 1916. Drill, K. T. and O. Company well No. 38.
D–138. Shutoff, K. T. and O. Company well No. 38.
December 15, 1915. Drill, K. T. and O. Company well No. 59.
December 15, 1915. Drill, K. T. and O. Company well No. 60.
D–77. Shutoff, K. T. and O. Company well No. 60.
December 15, 1915. Drill, K. T. and O. Company well No. 61.
D–59. Shutoff, K. T. and O. Company well No. 61.

SECTION 2, 32–23.
Letter, September 15, 1915. Shutoff, Section Two Syndicate, well No. 14.
Letter, December 9, 1915. Re K. T. and O. Company well No. 6 and North American Cons. well No. 8.

SECTION 3, 32–23.
Letter, October 18, 1915. Shutoff, K. T. and O. Company well No. 13.

SECTION 4, 32–23.
DD–27. Deepen, California Counties well No. 5.
Letter, January 30, 1916. Re California Counties well No. 5.
January 15, 1916. Drill, C. C. M. O. Company well No. 9.
D–132. Shutoff, C. C. M. O. Company well No. 9.
DD–81. Abandon, Midway Cons. well No. 4.
January 4, 1916. Drill, Standard Oil Company well No. 7.
D–115. Shutoff, Standard well No. 7.
DD–30. Deepen, Wilkes-Head well No. 1.
D–55. Shutoff, Wilkes-Head well No. 1.

SECTION 5, 32–23.
Letter, October 27, 1915. Re Kalispel well No. 3.
DD–98. Deepen, Kalispel Midway well No. 2.
Letter, April 3, 1916. Complaint re Kalispel well No. 2.
October 19, 1915. Shutoff, K. T. and O. Company well No. 2.
D–21. Shutoff, K. T. and O. well No. 3.
Form No. 113. June 22, 1916. Drill, Midway Five Oil Company well No. 7.
February 10, 1916. Drill, St. Lawrence Company well No. 8.
D–148. Shutoff, St. Lawrence well No. 8 (10″ casing).
D–232. Shutoff, St. Lawrence well No. 8 (6¼″ casing).

SECTION 6, 32–23.
Letter, September 3, 1915. Test, C. C. M. O. well No. 31.
D–8. Shutoff, C. C. M. O. Company well No. 31.
D–60. Shutoff, C. C. M. O. well No. 33.
May 1, 1916. Drill C. C. M. O. Company well No. 34.
D–207. Shutoff, C. C. M. O. Company well No. 34.
May 1, 1916. Drill, C. C. M. O. Company well No. 35.
May 24, 1916. Drill, C. C. M. O. Company well No. 36.
May 24, 1916. Drill, C. C. M. O. Company well No. 37.
June 30, 1916. Drill, C. C. M. O. Company well No. 38.
June 30, 1916. Drill, C. C. M. O. Company well No. 39.
June 30, 1916. Drill, C. C. M. O. Company well No. 40.
June 30, 1916. Drill, C. C. M. O. Company well No. 41.

SECTION 8, 32–23.
February 28, 1916, Drill, Hale-McLeod Oil Company well No 15.
D–113. Shutoff, Hale-McLeod well No. 15.
March 17, 1916. Drill, C. C. M. O. Company well No. 24.
D–163. Shutoff, C. C. M. O. well No. 24.

SECTION 8, 32-23—Continued.
May 24, 1916. Drill, C. C. M. O. Company well No. 25.
May 6, 1916. Drill, Hale-McLeod Oil Company well No. 16.
D–213. Shutoff, Hale-McLeod well No. 16.

SECTION 9, 32–23.
September 24, 1916. Drill, C. C. M. O. Company well No. 18
D–29. Shutoff, C. C. M. O. Company well No. 18.
June 30, 1916. Drill, C. C. M. O. Company well No. 19.

SECTION 10, 32–23.
Letter, September 10, 1915. Shutoff, C. C. M. O. Company well No. 9.
D–35. Shutoff, C. C. M. O. Company well No. 9.
September 14, 1916. Drill, Standard Oil Company well No. 6.
D–82. Shutoff, Standard well No. 6.

SECTION 14, 32–23.
Letter, September 21, 1915. Shutoff, Union Oil Company well No. 8.
DD–1. Redrill, Standard well No. 9.
Letter, October 11, 1915. Re water conditions, Visalia Oil Company.
September 4, 1915. Redrill, General Petroleum Company well No. 4.
October 15, 1915. Shutoff, General Petroleum Company well No. 4.
DD–39. Abandon, General Petroleum Company well No. 4.
DD–75. Abandon, Union Oil Company well No. 2.
DD–74. Abandon, Union Oil Company well No. 1.
DD–132. Abandon, Union Oil Company well No. 2.

SECTION 15, 32–23.
Letter, September 28, 1915. Re Brad Oil Company well No. 2.
Letter, December 2, 1915. Re Cons. Midway Chief well No. 2.
DD–32. Abandon, Cons. Midway Chief well No. 2.
DD–65. Abandon, Cons. Midway Chief well No. 1.

SECTION 16, 32–23.
DD–189. Redrill oil string, North American Cons. well No. 13.

SECTION 17, 32–23.
December 23, 1915. Drill, C. C. M. O. Company well No. 23.
D–71. Shutoff, C. C. M. O. Company well No. 23.
March 17, 1916. Drill, C. C. M. O. Company well No. 24.
D–140. Shutoff, C. C. M. O. Company well No. 24.
March 17, 1916. Drill, C. C. M. O. Company well No. 25.
D–191. Shutoff, C. C. M. O. Company well No. 25.

SECTION 22, 32–23.
Form No. 113. April 10, 1916. Drill, Fairbanks Oil Company well No. 9.

SECTION 23, 32–23.
May 12, 1916. Drill, Traders Oil Company well No. 106-A.
Various letters re conditions.

SECTION 24, 32–23.
Letter, September 27, 1915. Shutoff, C. C. M. O. Company well No. 12.
DD–20. Deepen, C. C. M. O. Company well No. 11.
DD–70. Plug off bottom water, C. C. M. O. Company well No. 7.
DD–69. Deepen, C. C. M. O. Company well No. 1.

SECTION 25, 32–23.
DD–172. Redrill, Safe Oil Company well No. 2.
DD–63. Redrill, Safe Oil Company well No. 3.
DD–166. Redrill, Tamalpais Oil Company well No. 3.
DD–108. Redrill oil string, W. T. and M. Company well No. 1.
Letter, October, 1915. Redrill, W. T. and M. Company well No. 5.
DD–188. Redrill, W. T. and M. Company well No. 7.

SECTION 26, 32–23.
March 10, 1916. Drill, North American Oil Company well No. 60.
D–105. Shutoff, North American Oil Cons. well No. 60.
April 10, 1916. Drill, North American Oil Cons. well No. 54.
D–127. Shutoff, North American Oil Cons. well No. 54.
May 1, 1916. Drills, North American Oil Cons. well No. 59.
D–157. Shutoff, North American Oil Cons. well No. 59.
February 26, 1916. Drill, North American Oil Cons. well No. 61.
D–122. Shutoff, North American Oil Cons. Company well No. 61.
May 12, 1916. Drill, North American Oil Cons. Company well No. 62.
D–214. Shutoff. North American Oil Cons. well No. 62.
June 6, 1916. Drill, North American Cons. well No. 63.
D–239. Shutoff, North American Oil Cons. well No. 63.
Notice, June 17, 1916. Drill, North American Cons. well No. 64.
DD–207. Redrill, Mt. Diablo Oil Mining and Dev. Company well No. 5

SECTION 36, 32–23.
April 11, 1916. . Drill, Bankline Oil Company well No. 1-A.
D–187. Shutoff, Bankline Oil Company well No. 1–A.
May 18, 1916. Drill, Bankline Oil Company well No. 8-A.
D–241. Shutoff, Bankline Oil Company well No. 8-A.

SECTION 4, 32–24.
D–65. Shutoff, Honolulu Consolidated well No. 2.

SECTION 8, 32–24.
March 30, 1916. Drill, Honolulu Cons. Oil Company well No. 8.
D–188. Shutoff, Honolulu Cons. well No. 8.
March 30, 1916. Drill, Honolulu Cons. Oil Company well No. 9.

SECTION 9, 32–24.
DD–52. Redrill and deepen, K. T. and O. Company well No. 17.

SECTION 10, 32–24.
Letter, September 13, 1915. Shutoff, Honolulu Cons. well No. 8.
DD–5. Deepen, Honolulu Cons. well No. 7.
DD–4. Abandon, Honolulu Cons. well No. 6.
D–16. Shutoff, Honolulu Cons. well No. 7.
D–15. Shutoff, Honolulu Cons. well No. 6.
June 15, 1916. Drill, Honolulu Cons. Oil Company well No. 9.

SECTION 12, 32–24.
D–12. Shutoff, Honolulu Cons. well No. 2.
DD–25. Redrilling, Honolulu Cons. well No. 2.
D–72. Shutoff, Honolulu Cons. well No. 2.
DD–123. Make pumping test, Honolulu Cons. well No. 2.

SECTION 15, 32–24.
Letter, September 27, 1915. Shutoff, K. T. and O. well No. 2.
May 25, 1916. Drill, K. T. and O. Company well No. 5.
May 25, 1916. Drill, K. T. and O. Company well No. 6.

SECTION 16, 32–24.
DD–202. Redrill, Petroleum Midway well No. 3.
Form No. 113. January 1, 1916. Drill. Petroleum Midway Company well No. 4.
DD–92. Test by pumping, Petroleum Midway Company well No. 4.
DD–130. Locate and Shutoff water, Petroleum Midway well No. 4.
DD–162. Locate water, Petroleum Midway well No. 4.
DD–195. Redrill, Petroleum Midway well No. 4.
D–236. Shutoff, Petroleum Midway well No. 4.
Notice, March 1, 1916. Drill, Petroleum Midway well No. 5.
D–186. Shutoff, Petroleum Midway well No. 5.
Form No. 113. April 1, 1916. Drill, Petroleum Midway well No. 6.

SECTION 16, 32–24—Continued.

D–202. Shutoff, Petroleum Midway well No. 6.
June 15, 1916. Drill, Petroleum Midway well No. 7.
June 17, 1916. Drill, Petroleum Midway well No. 8.
January 25, 1916. Drill, St. Helens Petroleum Company well No. 10.
October 30, 1915. Drill, St. Helens Petroleum Company well No. 11.
D–51. Shutoff, St. Helens Petroleum Company well No. 11.
December 13, 1915. Drill, St. Helens Petroleum Company well No. 12.
March 28, 1916. Drill, St. Helens Petroleum Company well No. 13, Alek well.
April 17, 1916. Drill, St. Helens Petroleum Company well No. 14.
May 20, 1916. Drill, St. Helens Petroleum Company well No. 15.
June 20, 1916. Drill, St. Helens Petroleum Company well No. 16.
DD–19. Deepening, Southern California Gas Company (Midway Gas Company), well No. 3.
Form No. 113. April 29, 1916. Drill, Southern California Gas Company well No. 4.
Form No. 113. April 29, 1916. Southern California Gas Company well No. 5.
DD–7. Redrill and deepen, Standard well No. 2.
Letter, September 22, 1915. Shutoff, Standard well No. 3.
DD–8. Redrill and deepen, Standard well No. 6.
Letter, October 11, 1915. Shutoff, Standard well No. 13.
DD–110. Deepen, Standard well "Alice."
October 13, 1915. Drill, Standard Oil Company well No. 14.
D–93. Shutoff, Standard well No. 14.
February 21, 1916. Drill. Standard Oil Company well No. 15.
February 21, 1916. Drill, Standard Oil Company well No. 16.
D–114. Shutoff, Standard well No. 16.
June 13, 1916. Drill. Standard Oil Company well No. 18.
June 13, 1916. Drill, Standard Oil Company well No. 19.

SECTION 17, 32–24.

May 25, 1916. Drill, K. T. and O. Company well No. 30.

SECTION 18, 32–24.

Letter, September 14, 1915. Shutoff, Standard well No. 1.
DD–49. Abandon, Standard Oil Company well No. 4.
Nov. 23, 1915. Drill Standard Oil Co. well No. 13.
D–112. Shutoff, Standard Oil Company well No. 13.
D–129. Shutoff. Standard well No. 10.
D–166. Shutoff, Standard well No. 13.
DD–203. Redrill. Standard well No. 8.
May 10, 1916. Drill, Standard Oil Company well No. 14.
May 10, 1916. Drill, Standard Oil Company well No. 15.

SECTION 22, 32–24.

Letter, October 13, 1915. Redrill and deepen, Maricopa Investment Company well No. 1.
D–81. Shutoff, Maricopa Investment Company well No. 1.

SECTION 28, 32–24.

Report dated August 21, 1915. Shutoff, Standard well No. 8. (Report signed by Kirwan.)
DD–72. Abandon, Standard well No. 5.
D–76. Shutoff, Standard well No. 8.

SECTION 30, 32–24.

DD–73. Abandon, Standard well No. 16.

SECTION 32, 32–24.

Letter, November 13, 1915. American Oil Fields well No. 5.
Letter, June 20, 1916. Re American Oil Fields wells 5 and 6.
DD–99. Redrill. Edmonds Midway well No. 3.

SECTION 32, 32–24—Continued.
- D–216. Shutoff, Edmonds Midway well No. 3.
- Letter, October, 1915. Drill, Edmonds Midway well No. 4.
- D–94. Shutoff, Edmonds Midway well No. 4.
- February 18, 1916. Drill, General Petroleum Company well No. 3. (Suspended drilling well.)
- Letter, October 19, 1916. Abandon, General Petroleum Company well No. 15.

SECTION 34, 32–24.
- Letter, October 14, 1915. Redrill and deepen, South Midway Oil Company well No. 4.
- DD–97. Abandon, Union, Lakeview No. 3. (Lake View Oil Co., well No. 3.)
- DD–89. Abandon, Union, Lakeview No. 4. (Lake View Oil Co., well No. 4.)
- DD–131. Abandon, Union well No. 6. (Lake View Oil Co., well No. 6.)
- DD–190. Abandon, Union well No. 6. (Lake View Oil Co., well No. 6.)
- DD–61. Abandon, Union Oil Co. well No. 7. (Lake View Oil Co., well No. 7.)

Statement of Operations.

SECTION 3, 31–22.

Work was started on the J. E. O'Donnell lease, consisting of the NE. ¼ of Section 3, 31–22, in April, 1916. On April 10th well No. 1 was spudded in, and on May 3d a very heavy gas sand was encountered at a depth of 850 feet. The derrick was wrecked and the well blew wild for several days before it could be capped and properly shut in. The management reports a measured flow of 17,400,000 cubic feet per day. Work was discontinued on this well, and on June 5th No. 2 well was spudded in.

On June 10th the same company started No. 1 well on the E. ½ of NE. ¼ of Section 2, 31–22. This firm has also taken over the SW. ¼ of Section 34, 30–22 and all of Sections 1 and 11, 31–22, and the holdings of the Fairfield Oil Company on Section 13, 31–22 and Section 19, 31–23.

The SW. ¼ of Section 15, 31–22 is divided into a checkerboard of ten-acre squares, each alternate ten acres belonging to the General Petroleum Company and to the Potter Oil Company. During the fall of 1915 and spring of 1916, these two companies started a crowding campaign by drilling four wells in each ten-acre tract. The shallow wells were drilled with rotary tools and the drilling program was continued westward until wells of diminished production made it a poor investment.

This section affords a splendid example of the uneconomical development and operation of oil land subdivided into small tracts, and especially when neighboring companies fail to establish mutual drilling restrictions. It is merely the culmination of the old time method of being first to the oil, regardless of capital investment.

SECTION 21, 31–22.

The State Consolidated Oil Company took over the N. ½ of NW. ¼ of Section 21, 31–22 early in April, 1916. They planned to put the old wells in shape and to start a drilling campaign.

The management of this company did everything within their power to furnish this department the necessary data preparatory to redrilling or abandoning the old wells, but the information was not available. This case affords a very good example of the value of filing such records with the Mining Bureau, as a part of a permanent file, to be available at any future date regardless of the changes of personnel on the property.

SECTION 35, 31–22.

Between October, 1915, and May, 1916, the Associated Oil Company drilled 13 shallow wells on Section 35, 31–22 with very satisfactory results.

SECTION 19, 31–23.

The Union Oil Company acquired the N. ½ of N. ½ of Section 19, 31–22 from the Midway Royal Petroleum Company, and in April, 1916, started drilling the No. 2 well.

SECTION 2, 31–23.

In October, 1915, the Associated Oil Company made a proposal to drill a new well, No. 3 (number since changed to 72), in the center of the SE. ¼ of SE. ¼ of Section 20, 31–23, with the rotary method. They planned to drill through the top water sands, top gas horizon, upper oil zone and intermediate water sands with one string of casing, by using the mud laden fluid method of protecting the upper oil and gas formations from the water.

These plans were the pivot of much correspondence and many conferences, and after many delays, the well was started with plans to protect each formation with a string of casing. After landing the 12½″ casing to shut off top water and drilling ahead some 340 feet, the 12½″ casing collapsed. With the then existing conditions, as an emergency measure, it was deemed advisable to sanction the use of the mud laden fluid method to sidetrack the collapsed casing, and to drill down through the formations to a point above the second oil measures.

After cementing the casing and drilling ahead through the lower oil measures, the well was deepened, and a heavy flow of gas was encountered. The well has been serving the high pressure gas lines for several months.

SECTION 22, 31–23.

The drilling program on the S. ½ of Section 22, 31–23, brought up the question of the present economical values to be won from the top gas formations and upper oil sands. One company maintained that these sands were commercially exhausted, in support of a proposed drilling plan. The proposal was to use one string of casing with the mud laden fluid method of shutting off all of the formations above the lower oil sands. As yet this department has ruled that the different series of gas and oil formations should be protected by separate strings of casing. In such a policy we have the support of a large majority of the operators of this field. Nevertheless, our aim is to be constructive, as well as to conserve the oil and gas reserves, and we do not desire to take a stand which may in any way hinder the introduction of methods which may result in a material saving to the operator in casing cost, providing no damage results from the innovation.

SECTION 26, 31–23.

This office has had many interviews and much correspondence with the officers of the Associated Oil Company relative to the proper drilling methods to be used on Section 26, 31–23. Their proposal was to set one string of casing with rotary mud and cement, after passing through the top waters and upper gas measures, in order to develop the first oil measures. This section has been a heavy gas producer and is at the present time. Several wells of the Associated and of the Standard Oil Companies are used solely as gas producers.

This department ruled adversely on the proposal to drill line wells by this method, but did approve of the drilling of well No. 6 (old No. 9) as a test well. The well was to be located in the center of the Associated Oil Company's wells on the N. ½ of N. ½ of the section. In this case any damage that might occur from this method of protecting the gas zone would first effect the wells belonging to that company, and theoretically, the damage could then be corrected at the expense of the Associated Oil Company before the neighboring companies were harmed. The company did not drill this well, but did drill several wells along the lines, and protected the gas zone in each case by landing a separate string of casing below the top waters and above the gas.

It should be clearly stated here that this department does not aim to take an arbitrary stand in any such rulings, and desires to do everything possible to make all of its rulings harmonize with progressive methods. The department is willing to cooperate at any time with the operators desiring to carry on experimental work, when such experiments are not liable to cause damage to wells on neighboring properties.

SECTION 27, 31–23.

The famous fire well of the Kern Trading and Oil Company in the NW. corner of Section 27, 31–23, offsetting the wells of the Record Oil Company and the Consolidated Mutual Oil Company on Section 28, has been considered to be a menace to the surrounding territory for some time. It is not possible to definitely attribute all of the water trouble of this vicinity to the condition of the K. T. and O. No. 2 well, as the conditions in some of the adjoining wells are open to criticism. The No. 2 well was drilled only to the top oil sand when it came in as a gusher and caught fire. This department has recommended to the K. T. and O. Company that an effort be made to shut off the top waters by cementing a string of 8¼″ casing below the depth of the original 10″ shutoff. This well has been the subject of much discussion, and the officials of the K. T. and O. Company have uniformly assisted this office in every way possible, furnishing all data requested, and in addition, a series of detailed charts giving the curves of water production during the period the well produced.

SECTION 28, 31–23.

One of the more difficult problems confronting this department is furnished by Section 28, 31–23. Much water is reported in the wells across the N. ½ of the section. The first study started by the Taft office covered this territory. The federal courts placed these properties in the care of Receiver H. M. Payne.

SECTION 31, 31–23.

The Chanslor Canfield Midway Oil Company, in response to a formal complaint from the Alaska Pioneer Oil Company, undertook to locate and shut off the water in well No. 8 in the SE. corner of Section 31, 31–23, and were successful in so doing.

The Consolidated Mutual Oil Company was drilling a deep test hole, No. 6, and had just landed the 8¼″ casing, when the wind storm of January 27th destroyed the derrick. Drilling operations have remained suspended since that date.

SECTION 32, 31–23.

The question of localizing the water troubles in the east central portion of Section 32, 31–23, radiating around the old Buick and Pacific crude gusher wells, has had the attention of this department for many months. It is the opinion of this office that the bottom water in Buick well No. 5 and Pacific Crude well No. 1 has been properly plugged off and that the water now produced by each of these wells (approximately 50 per cent) is derived from the Buick well No. 3, situated one location north and midway between the two wells mentioned. Buick No. 3 well is reported to be in very bad shape, with tools lost in the hole and the casing collapsed. This information has not been verified by test as the derrick was destroyed by the wind storm.

This territory originally was very productive and a center of gusher wells, but lack of proper correlation of the water sand (intermediate water, but commonly spoken of as bottom water), which is found at a depth of only 30 or 50 feet below the bottom of the upper oil sands, led many of the drillers to carry the oil string too low, with disastrous results to that splendid oil sand. Work should be undertaken immediately to clear the No. 3 Buick well of tools and other junk and these bottom sands should be plugged off. This well is in the care of Receiver H. M. Payne.

SECTION 36, 31–23.

The Standard Oil Company drilled eleven new wells and deepened four old wells during the period under review, on the McNee lease, comprising all of Section 36, 31–23. This property is a splendid producer and is being systematically drilled up, contrary to the usual custom in this field of confining operations to the line wells when a company controls an entire section. Because of a drilling agreement with the neighboring K. T. and O. Company previous drilling had been carried on two locations back from the property lines. Since the first of the year, both companies have been drilling the line wells. The production on the McNee lease is being won from the west limb of the Buena Vista anticline. The crest of the anticline, as shown by the surface geology, passes diagonally across the NE. $\frac{1}{4}$ of the section, in a northwest-southeast direction.

SECTION 10, 31–24. (Elk Hills.)

In December, 1915, the General Petroleum Company abandoned their No. 1 well on Section 10, 31–24, in the Elk Hills, and dismantled the camp. The well had been drilled to a depth of 3072 feet without encountering any oil or gas sands.

SECTION 4, 32–23.

The Midway Consolidated Oil Company abandoned their No. 4 well on Section 4, 32–23. The upper oil sands in the vicinity of this well should be greatly benefited by plugging of this well, which had been redrilled so often and with such unsatisfactory results.

In testing out the Wilkes Head well in the north central part of Section 4, it was found to be making considerable water. Pumping tests are being carried on over a long period with hopes of exhausting the water from the oil sands. The well stood idle with the water in on the sand for many months.

SECTION 5, 32–23.

The No. 2 well on the Kalispel lease, Section 5, 32–23 has produced large quantities of water and the present management proposed to case off this upper flooded oil bearing horizon and deepen the well to the lower sands, which furnish the production in the wells on the neighboring leases to the north and east. This caused a protest to be made by the neighbors to the west and south as they feared that the quantity of water formerly raised by the pump at Kalispel No. 2 well, would soon back up and flood other top sand-producing wells, in case the proposed work was carried out. The informal complaint has developed into an investigation that now includes nearly all of the wells on Section 5. This office has made several graphic sections and gathered considerable evidence from interested parties, but still lacks a few logs and well records. Some of the most vital well records seem to be nonexistent.

SECTION 23, 32–23.

A difference of opinion has existed for several years between the respective operators of the Indian and Colonial Development Company, and the Traders Oil Company, as to the source of the water which troubles the wells of these companies on Sections 22 and 23, 32–23. It was originally considered to be bottom water and considerable work has been done in the past in attempting to shut off bottom water. In May, 1916, the Traders Oil Company started a new well, No. 106, and drilled it dry in order to test out the various formations. They were very successful in determining that there is an intermediate water between the top oil sands and the bottom oil measures, as developed in a few of the wells in the immediate vicinity. It is hoped that this discovery will lead to the correction of one of the oldest water problems on Twenty-Five Hill and the Midway Field.

SECTION 24, 32–23.

All of Section 24, 32–23, except the W. ½ of the SW. ¼, has been operated by the Chanslor Canfield Midway Oil Company under lease from Mr. J. W. Jameson until July 1, 1916, when Mr. Jameson purchased the lease back from that company and started to operate the property.

SECTION 26, 32–23.

The North American Oil Consolidated Company started a drilling campaign in the spring on their lease holdings on Section 26, 32–23. Seven wells have been completed.

SECTION 36, 32–23.

In drilling two line wells on the Bankline lease on Section 36, 32–23 the management crowded the wells within 20 feet of the property line.

There may have been a drilling agreement which permitted these locations in this special case, but as a rule, such methods are the direct cause of wasteful expenditures by both companies affected by such crowding, as offset wells are usually in turn crowded in as a defensive measure.

SECTION 16, 32–24.

A keen drilling rivalry between the companies operating in Section 16, 22–24 resulted in the starting of twenty new wells and the deepening of six others during the fiscal year. This section affords another illustration of a crowding campaign, as practically all of these wells have been drilled to protect the lines. In locating the wells 150 feet from the lines it often brings offset wells within 300 feet of each other, while the individual companies aim to space their own wells from 500 to 700 feet apart in that fairly deep territory.

Unfortunately, when the company holdings represent small leases, there seems to be little opportunity to reach any agreement whereby the wells may be located further than 150 feet from the line; and on small tracts it is usually impossible to stagger the offset location to any advantage.

The drilling of so many new wells on this section will hasten the day when the wells will have to be pumped to win the oil from the present sands. Already preparations are being made to prospect for lower sands below the water sands now termed bottom water.

Records Received for Midway Field.

The following list of oil companies of the Midway Field shows at a glance to what extent each company has cooperated with this department in furnishing the desired logs and production reports:

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 2, 31-22—				
J. E. O'Donnell lease	1	None	None	Drilling.
Sec. 3, 31-22—				
J. E. O'Donnell	3	1	----------	Drilling.
Sec. 4, 31-22—				
Globe Exploration Company	1	----------	----------	Idle.
Midway Chief Oil Company	2	----------	----------	Idle.
Sec. 9, 31-22—				
General Petroleum, "Carnegie"	1	----------	----------	Idle.
Drake & Yancey Oil Company	1	----------	----------	Idle.
Sec. 10, 31-22—				
Union Oil Company	1	----------	----------	Idle.
N. American Consolidated O. Company	1	----------	----------	Idle.
Sec. 11, 31-22—				
J. E. O'Donnell lease, formerly Fairfield Oil Company	1	----------	----------	Drilling.
Sec. 12, 31-22—				
A. O. F. Midland Oil Fields, Ltd.	3	All	Yes	Idle.
General Petroleum Company, "Oakburn"	2	1	Yes	Idle.

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 13, 31-22—				
J. E. O'Donnell lease, formerly Fairfield Oil Company	5	----------	Yes	Idle.
Oakland Midway Oil Company	4	----------	Yes	
General Petroleum Company	4	4	Yes	
Sec. 14, 31-22—				
Engineers Oil Company	5	----------	Yes	
General Petroleum, "Shale"	18	18	P	
Combined Oil Company	8	8	P	
Alberta Midway Oil Company	10	----------	----------	
Manley & McGinn Oil Company	5	----------	P	
Midway Gas and Petroleum Company	4	----------	----------	
Onisbo Oil Company	1	----------	----------	Idle.
Stockton Midway Oil Company	6	----------	P	
Sec. 15, 31-22—				
K. T. & O. Company	14	13	P	
Security Development Company	10	----------	P	
Manley & McGinn	5	----------	P	
Midway Peerless Oil Company	10	1	P	
Hondo Oil Company	12	10	P	
Dominion Oil Company	4	4	P	
Banklin Oil Company	9	1	----------	
M. Z. Elliott, "Fortune"	6	----------	----------	
General Petroleum Company	38	38	P	
Potter Oil Company	17	17	P	
Sec. 16, 31-22—				
Traders Oil Company	1	----------	----------	Abandoned.
Sec. 17, 31-22—				
State Consolidated Oil Company	1	----------	----------	Idle.
Durango Oil Company	1	----------	----------	Idle.
Dabney Oil Company	1	----------	----------	Idle.
Sec. 21, 31-22—				
State Consolidated Oil Company	3	----------	----------	Drilling.
C. C. M. O. Company	1	----------	----------	Idle.
Sec. 22, 31-22—				
C. C. M. O. Company	3	----------	----------	
Sec 23, 31-22—				
Pinal Dome Oil Company	9	9	P	
Pinal Dome, "Gem"	3	3	P	
Tumbador Oil Company	13	1	P	
K. T. & O. Company	15	15	P	
General Petroleum Company, "Logan"	8	8	P	
Rock Oil Company	10	4	P	
Sec. 24, 31-22—				
Midway Pacific Oil Company	5	----------	P	
Coalinga Monterey O. Company	3	----------	P	
Brookshire Oil Company	8	----------	P	
United Oil Company	2	2	----------	Idle.
San Francisco Midway Oil Company	3	2	----------	Idle.
Sec. 25, 31-22—				
K. T. & O. Company	7	7	P	
Midland Oil Fields Company, Ltd.	3	2	P	
C. C. M. O. Company	11	----------	----------	
Recovery Oil Company	6	----------	P	
Visalia Midway Oil Company	6	----------	P	
Sec. 26, 31-22—				
G. P. Co., "Brunswick"	6	4	P	
Result Oil Company	2	----------	----------	
El Camino Oil Company	3	----------	----------	
C. C. M. O. Company	2	----------	----------	
Pyramid Oil Company	6	----------	P	
Mocal Oil Company	5	5	----------	
Soudan Oil Company	10	----------	----------	
California Star Oil Company	5	5	----------	
Dabney Oil Company	7	----------	----------	
Armstrong & Jergins Oil Company	3	----------	----------	
State Consolidated Oil Company	15	----------	----------	

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 27, 31-22—				
Maxwell Oil Company	1			Idle.
International Oil Company	1			Idle.
C. C. M. O. Company	1			Idle.
Sec. 30, 31-22—				
Cree Oil Company	1			Idle.
Sec. 35, 31-22—				
C. C. M. O. Company	9			
Associated Oil Company	24	23	P	One water well.
Sec. 36, 31-22—				
A. O. F. Company, Ltd.	52	52	P	
C. C. M. O. Company	17			
T. 31, R. 23—				
Sec. 1, J. F. Carmen Company	1			Suspended.
Sec. 2, Combination Midway O. Co.	1			Suspended.
Sec. 6, Union Oil Co. (Rudisen)	1			Abandoned.
Sec. 8, Calinava Oil Company	1			Suspended.
Rex Oil Company	1			Abandoned.
Sec. 10, Mercedes Oil Company	1			Abandoned.
Sec. 11, Hart Oil Company	1			Suspended.
Sec. 14, Barnedon Oil Company	1	1		Idle.
Sec. 16, Standard Oil Company	4			Abandoned.
Sec. 17, S. O. Co., "Burr"	1			Abandoned.
Sec. 18, Midland O. F., Ltd.	1	1		
Sec. 18, Toronto Midway Oil Company	1			Abandoned.
Sec. 19, Midway Royal Oil Company	1	1	P	
G. P. Company	1			
J. E. O'Donnell lease, Fairfield	2			
Calidon Petroleum Company	2	2		Idle.
Sec. 20, 31-23—				
Associated Oil Company	3	2	P	
United Oil Company	6	6	P	
Sec. 21, 31-23—				
K. T. & O. Company	1	1	P	
Sec. 22, 31-23—				
Associated Oil Company	8	6	P	
Standard Oil Company	7	6	P	
Sec. 24, 31-23—				
Union Oil Company	4			Idle.
Barnedon Oil Company	1	1		Idle.
Sec. 25, 31-23—				
K. T. & O. Company	4	2	P	
Sec. 26, 31-23—				
Associated Oil Company	9	8	P	
Standard Oil Company	12	11	P	
Sec. 27, 31-23—				
K. T. & O. Company	2	2	P	
Sec. 28, 31-23—				
Record Oil Company	4			Care of Fed. receiver.
S. O. Co., "Columbus"	4	4	P	Care of Fed. receiver.
Consolidated Mutual Oil Company	14	13	P	Care of Fed. receiver.
United Oil Company	2	2	P	Care of Fed. receiver.
California Amalgamated Oil Company	3			Care of Fed. receiver.
Caribou Oil Company	4			Care of Fed. receiver.
Sec. 30, 31-23—				
Pioneer Midway Oil Company	67	6	P	
N. A. O. Consol Co., Consolidated Mutual	6	4	P	2 suspended drillers.
Sec. 31, 31-23—				
Honolulu Consolidated Company	17	7	P	4 abandoned.
C. C. M. O. Company	15			
Mammoth Oil Company	7			
Eagle Creek Oil Company	12			
Sec. 32, 31-23—				
Olig Crude Oil Company	6		P	1 abandoned.
General Petroleum Company	1			
Pacific Crude Oil Company	4	3	P	1 abandoned.

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 32, 31-23—Continued.				
Alaska Pioneer Oil Company	10	9	P	
Buick Oil Company	5	----------	P	
California Midway Oil Company	8	----------	----------	
McMurtry & Hoeppner	1	----------	----------	Abandoned.
Associated Oil Company	3	3	P	
Sec. 33, 31-23—				
K. T. & O. Company	3	3	P	
Sec. 34, 31-23—				
Associated Oil Company	10	7	P	3 drilling.
Union Oil Company, "McLeod"	8	5	P	
Sec. 35, 31-23—				
K. T. & O. Company	7	7	P	
Sec. 36, 31-23—				
Standard Oil Company, McNee lease	46	38	P	8 new.
Sec. 32, 31-24—				
General Petroleum Co., Buena Vista lease	4	4	P	
St. Helens Petroleum Company	2	----------	P	
Boston Pacific Oil Company	2	----------	P	
Sec. 1, 32-22—				
C. C. M. O. Company	17	----------	----------	
Sec. 1, 32-23—				
K. T. & O. Company	15	10	P	4 drilling; 1 aband'd.
Sec. 2, 32-23—				
N. A. O. Consolidated Company	14	14	P	
Sec. 3, 32-23—				
K. T. & O. Company	3	3	P	
Sec. 4, 32-23—				
Midway Consolidated Oil Company	4	1	P	
Standard Oil Company, "Equitable"	3	1	P	
Canadian Pacific Oil Company	3	3	P	
Wilkes Head Oil Company	1	----------	----------	
California Counties Oil Company	5	5	P	
C. C. M. O. Oil Company	3	----------	----------	
Sec. 5, 32-23—				
K. T. & O. Company	12	10	P	1 abandoned.
St. Lawrence Oil Company	8	----------	P	
Kalispel Oil Company	3	----------	----------	
Midway Five Oil Company	7	----------	----------	
Midway Premier Oil Company	8	8	----------	
Hale McLeod Oil Company	7	----------	P	
Sec. 6, 32-23—				
C. C. M. O. Company	41	----------	----------	
United Oil Company	9	9	P	
Sec. 8, 32-23—				
Hale McLeod Oil Company	10	6	P	
C. C. M. O. Company	25	----------	----------	
Sec. 9, 32-23—				
C. C. M. O. Company	10	----------	----------	
Traffic Oil Company	4	----------	----------	
Sec. 10, 32-23—				
S. O., "Equitable"	7	4	P	
Standard Oil Company	10	9	P	
C. C. M. O. Company	7	----------	----------	
Sec. 12, 32-23—				
Standard Oil Company	5	5	P	
Sec. 13, 32-23—				
K. T. & O. Company	4	4	P	
Sec. 14, 32-23—				
Standard Oil Company	10	8	P	
G. P. Continental	5	5	P	
Union Oil Company, "Regal"	7	5	P	
U. O. Company, "Bedrock"	4	2	P	
Sec. 15, 32-23—				
Empire Gas and Fuel Company	4	----------	----------	
Union Oil Company, "Equitable"	1	----------	P	
Union Oil Company, "Alvarado"	3	----------	P	
National Pacific Oil Company	2	----------	----------	

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 15, 32-23—Continued.				
Kenewha Oil Company	1			
S. K. D. Oil Company	2			
N. A. O. Consolidated Company	1			
Brad Oil Company	3	2	P	
G. P. Co., "Foxtail"	3	3	P	
Oleum Crude Company	2			
Consolidated Midway Chief Oil Company	2			Both abandoned.
C. C. M. O. Company	2			
Sec. 16, 32-23—				
Midland Oil Company	9	9	P	
N. A. O. Consolidated Company	23	1		
N. A. O. Consolidated Co., Lockwood lease	16		P	
Sec. 17, 32-23—				
C. C. M. O. Company	24			
Sec. 21, 32-23—				
C. C. M. O. Company	12			
Sec. 22, 32-23—				
Fairbanks Oil Company	10	1	P	
General Petroleum Company, "Sibyl"	9	9	P	
Producers Guaranteed Company	1			
Burks Oil Company	5			
Combination Midway Oil Company	1			
Wilbert Oil Company	1	2		
Buena Fe Oil Company, Usona	2	2	P	
Buena Fe West Forty	11	11	P	
Buena Fe Amador	11	11	P	
Buena Fe Alpine	5	5	P	
Buena Fe Amazon	6	6	P	
Buena Fe Bay City	10	9	P	
Buena Fe Mountain Girl	20	18	P	
Indian-Colonial Dev. Company	26	26	P	
Sec. 23, 32-23—				
Indian-Colonial Dev. Company	3			Abandoned.
Griffin Crude Oil Company	1			Abandoned.
Traders Oil Company	13	13	P	
Cheney Stimson Oil Company	6			
Palmer Union Oil Company	9			
E. J. Boust	1			Idle.
Knob Hill lease	4			All idle.
Kern Crown Oil Company	11			
Sec 24, 32-23—				
J. W. Jameson	25			
Standard Oil Company	4	4		
Sec. 25, 32-23—				
Section Twenty-five Oil Company	30		P	
Rico Oil Company (Princeton Oil Co.)	6		P	
Pierpont Oil Company	13			
T. W. Oil Company	5		P	
Millie Francis Oil Company	4			
Tamalpais Oil Company	4			
Elkhorn Oil Company	4			
San Francisco Midway Oil Company	3			
Seaboard Oil Company	2			
General Petroleum Company (Serongo)	8	8	P	
General Petroleum, "Halloway"	16	16	P	
Opal Oil Company	3			
Cresceus Oil Company	11			
Safe Oil Company	4		P	
West Side Oil Company	4			
W. T. & M. Oil Company	7	1	P	
B. H. & C. Oil Company	8	2	P	
Sec. 26, 32-23—				
Mascot Oil Company	43	2		
N. A. O. Consol. Oil Company	42		P	
General Petroleum, "Nev. Midway"	16	16	P	
Dunlop Oil Company	7			
Wilbert Oil Company	8	8	P	

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 26, 32-23—Continued.				
Penn. Consolidated Oil Co., alias March Oil Co., alias January Oil Co.	6			
Hayden Oil Company	8			
Carbo Oil Company	10		P	
Mt. Diablo O. M. & D. Co., formerly J. M. & S. Co.	7	7		
Mt. Diablo Oil Co., alias Malayan Oil Co.	2			
Sec. 35, 32-23—				
Victor Oil Company	4			
U. O. Co., alias Dunlop Oil Co.	3			
Union Oil Company	1			
Sec. 36, 32-23—				
G. P., "Bankline"	13	13		
Los Posos Oil Company	2			
Sec. 2, 32-24—				
Honolulu Consolidated Oil Co.	3	3	P	
Township 32, Range 24—				
Sec. 4, Honolulu Consolidated Oil Co.	5	5	P	
Sec. 5, Honolulu Consolidated Oil Co.	6	6	P	
Sec. 8, Honolulu Consolidated Oil Co.	9	9	P	
Sec. 10, Honolulu Consolidated Oil Co.	9	9	P	
Sec. 12, Honolulu Consolidated Oil Co.	4	4	P	
Sec. 14, Honolulu Consolidated Oil Co.	5	5	P	
Sec. 24, Honolulu Consolidated Oil Co.	4			Idle.
Sec. 5, 32-24—				
Kern Trading and Oil Company	2	2	P	
Sec. 7, Kern Trading and Oil Company	2	2	P	
Sec. 9, Kern Trading and Oil Company	6	6	P	
Sec. 11, Kern Trading and Oil Company	4	4	P	
Sec. 15, Kern Trading and Oil Company	4	3	P	One new.
Sec. 17, Kern Trading and Oil Company	3	1	P	
Sec. 16, 32-24—				
Midway Gas Co. or So. California Gas Co.	5	1	P	2 new.
Petroleum Midway Oil Company	8	5	P	
St. Helens Petroleum Company	16	16	P	
Standard Oil Company, "Derby"	19	2	P	
Sec. 18, 32-24—				
Standard Oil Company	8	8	P	
Sec. 20, 32-24—				
Standard Oil Company	8	5	P	
Sec. 19, 32-24—				
Kern Trading and Oil Company	4	4	P	
Sec. 22, 32-24—				
Maricopa Investment Company	4	4	P	
Schultz et al.	3			
General Petroleum Company	3	3		
Luxor Oil Company	1			
Sec. 26, 32-24—				
Lake View Annex Oil Company	1			Idle.
Manitoba Crude Oil Company	1			Idle.
Lake View No. 2 Oil Company	2			Idle.
Sec. 28, 32-24—				
Pyramid Oil Company	1		P	
Petroleum Syndicate	2			Idle.
Baltimore Oil Company	3			Idle.
Standard Oil Company	8	5	P	
Sec. 29, 32-24—				
K. T. & O. Company	2	2	P	
Sec. 30, 32-24—				
Standard Oil Company	23	19	P	
Sec. 31, 32-24—				
C. C. M. O. Company	2			Idle.
American Oil Fields Company, Ltd.	2	2	P	Idle.
Kline Oil Company	1			Idle.
Union Oil Company	1			Idle.
August Water Company	5			All water wells.

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 32, 32-24—				
Edmonds Midway Oil Company	4	3	P	
Knickerbocker Oil Company	1			
General Petroleum Company	9	9		
Manhattan Midway Oil Company	3			
American Oil Fields Co., Ltd.	13	13	P	
Sec. 33, 32-24—				
K. T. & O. Co.	5	4	P	One new.
Sec. 34, 32-24—				
Union Oil Company, "Lake View"	5		P	Suspended drillers.
Union Oil Company	3		P	
Lake View No. 2 O. Co. (Extension)	1			
Lake View No. 2, "S. Midway"	2			
Sec. 36, 32-24—				
Golden Gate Oil Company	1			Idle.

Official decisions were made on the following wells:

Section 4, 11–23.
D–42. Shutoff, Interstate Oil Company well No. 4.
D–135. Shutoff, Interstate Oil Company well No. 4.
Form No. 113. December 30, 1915. Drill, Interstate Oil Company well No. 6.
D–136. Shutoff, Interstate Oil Company well No. 6.
May 13, 1916. Drill, Interstate Oil Company well No. 8.
Letter, October 20, 1915. Shutoff, Lakeview No. 2 Oil Company well No. 1.
Letter, October 31, 1915. Shutoff, Lakeview No. 2 Oil Company well No. 3.
D–91. Shutoff, Lakeview No. 2 Oil Company well No. 3.
December 10, 1915. Drill, Lakeview No. 2 Oil Company well No. 5.
May 13, 1916. Drill, Lakeview No. 2 Oil Company well No. 7.
D–48. Shutoff, Miocene Oil Company. (P. Welch well No. 3.)
Letter, October 25, 1915. Abandon, Union Oil Company, International well No. 1.
Letter, August 28, 1915. Shutoff, Union Oil Company, International well No. 3.
DD–76. Drill, Union Oil Company, International well No. 4.
D–156. Union Oil Company, Shutoff, International well No. 4.
D–201. Shutoff, Union Oil Company, International well No. 4.

Section 6, 11–23.
113. April 12, 1916. Drilling, Bankline well No. 5.
March 3, 1916. Drill, General Petroleum Company well No. 5–B.
D–131. Shutoff, General Petroleum Company well No. 5–B.
DD–173. Deepen, General Petroleum Company well No. 5–B.
D–196. Shutoff, General Petroleum Company well No. 5–B.
D–228. Shutoff, General Petroleum Company well No. 5–B.
December 21, 1915. Drill, General Petroleum Company well No. 6–B.
D–144. Shutoff, General Petroleum Company well No. 6–B.
D–208. Shutoff, General Petroleum Company well No. 6.
DD–144. Redrill General Petroleum Company Well No. 7–B.
DD–6. Redrill and deepen, General Petroleum Company well No. 9–B.
Form No. 113. April 12, 1916. Drilling, General Petroleum Co. well No. 11–B.
Form No. 113. April 12, 1916. Drilling, General Petroleum Co. well No. 12–B.
Form No. 113. April 12, 1916. Drilling, General Petroleum Co. well No. 17–B.
D–4. Shutoff, Maricopa National Petroleum Company well No. 2.
April 27, 1916. Drill, Maricopa National Petroleum Company well No. 7.

Section 10, 11–23.
DD–112. Abandon, El Camino Oil and Dev. Company well No. 1.
DD–160. Abandon, El Camino Oil and Dev. Company well No. 1.

Section 29, 11–23.
DD–78. Abandon, Bakersfield Pipe and Wrecking Company for Sunset Security Oil Company well No. 1.

Section 1, 11–24.
DD–83. Deepen, Standard well No. 1.
DD–37. Redrill, Standard, Maricopa wells 3, 5, 12 and 18. See also various letters.
DD–169. Redrill and deepen, Standard well No. 3.
DD–68. Test by pumping, Standard well No. 5.
DD–87. Deepen, Standard well No. 5.
D–190. Shutoff, Standard well No. 12.
D–130. Shutoff, Standard well No. 14.
D–92. Shutoff, Standard well No. 16.
D–237. Shutoff, Standard well No. 18.
DD–171. Deepen, Standard well No. 20.
February 21, 1916. Drill, Standard Oil Company well No. 22.
D–224. Shutoff, Standard Oil Company well No. 22.
DD–182. Redrill Oil String Melita Oil Company well No. 15.

Section 2, 11–24.
DD–150. Deepen, McCutcheon Bros. well No. 6.
DD–146. Abandon, Sunset Monarch well No. 10.
DD–147. Abandon, Sunset Monarch well No. 24.
Form No. 113. April 14, 1916. Drill, Sunset Monarch well No. 26.
Form No. 113. April 14, 1916. Drill, Sunset Monarch well No. 27.

Section 12, 11–24.
Letter, November 1, 1915. Shutoff, Cons. Midway Chief well No. 4.
March 1, 1916. Drill, Good Roads Oil Company well No. 3.
D–133. Shutoff, Good Roads Oil Company well No. 3.
May 29, 1916. Drill, Good Roads Oil Company well No. 8.
D–238. Shutoff, Good Roads Oil Company well No. 8.
March 1, 1916. Drill, Petrolia Oil Company well No. 3.
D–106. Shutoff, Good Roads Oil Company well No. 3.
March 21, 1916. Drill, Petrolia Oil Company well No. 4.
D–198. Shutoff, Petrolia Oil Company well No. 4.
June 19, 1916. Drill, Petrolia Oil Company well No. 5.

Section 28, 12–23.
DD–135. Abandon, Midas Oil Company well No. 1.

Section 30, 12–23.
Letter, November 17, 1915. Complaint, K. T. and O. Company No. 35 vs. Gen. Pet. Company No. 2, National Pacific well No. 2.
DD–124. Redrill oil string, Nat. Pacific Oil Company well No. 1.

Section 31, 12–23.
Letter, September 22, 1915. Shutoff K. T. and O. Company well No. 26.
Letter, October 10, 1915. Shutoff K. T. and O. Company well No. 26.

Section 32, 12–23.
DD–41. Redrill, ElDora Oil Company well No. 2.
DD–168. Redrill, General Petroleum Company well No. 3–A.
Letter, September 4, 1915. Shutoff, Maricopa Northern well No. 1.
Letter, September 29, 1915. Shutoff, Maricopa Northern well No. 1.
Letter, October 4, 1915. Abandon, Maricopa Northern well No. 2.
DD–40. Redrill, Midland Oil Fields Company well No. 3.
D–185. Shutoff, Midland Oil Fields Company well No. 3.

Section 32, 12–23—Continued.
D–149. Shutoff, Midway Northern well No. 2.
DD–198. Redrill, Obispo Oil Company well No. 3.
DD–38. Redrill, Spreckels Oil Company well No. 2.

Section 25, 12–24.
Letter, September 23, 1915. Shutoff, K. T. and O. Company well No. 14.
DD–158. Abandon, K. T. and O. Company well No. 14.
DD–216. Abandon, Union Oil Company "Lakeview" well No. 12.

Section 26, 12–24.
DD–145. Abandon, Sunset Monarch Oil Company well No. F.
DD–157. Redrill, Sunset Monarch Oil Company well No. G.
April 14, 1916. Drill, Sunset Monarch Oil Company well No. M.

Section 35, 12–24.
DD–154. Cut casing from well. Union Oil Company well No. 6. (Sage No. 6.) (See also correspondence re this work.)

Section 36, 12–24.
DD–16. Abandon, Ethel D. well No. 1.
D–75. Shutoff, Ethel D. well No. 17.
Letter, October 8, 1915. Deepening, Ethel D. well No. 19.
DD–11. Deepening, Ethel D. well No. 22.
April 8, 1916. Drill, Ethel D. well No. 30.
D–173. Shutoff, Ethel D. well No. 30.
May 12, 1916. Drill, Ethel D. Oil Company well No. 31.
DD–102. Deepen, M. J. and M. and M. Cons. well No. 29.
December 14, 1916. Drill, M. J. and M. and M. Cons. well No. 44.
D–80. Shutoff, M. J. and M. M. Cons. well No. 44.

SUNSET OIL FIELD.

Statement of Operations.

Section 4, 11–23.

On Section 4, 11–23 on the Maricopa flat, the Interstate Oil Company, adjoining the famous Lake View No. 2, Oil Company on the north, completed wells No. 4 and No. 6, and started well No. 8. This lease is operated under the same management as the Lake View No. 2 Oil Co., where wells No. 3, No. 5 and No. 7 have been drilled. The work of cleaning out No. 1 well, the famous gusher, is under way. It is planned to fish out the old string of 6¼″ casing to a point below the old 8¼″ casing, then sidetrack the old 6¼″ casing by carrying a new string of the same size, and after shooting for the purpose of smashing the old casing, to cement the new string in with a large quantity of cement. On previous attempts to redrill this well it showed a great deal of life, breaking loose with a large flow of emulsion. On the present occasion the well was thoroughly mudded to start with, and thus far, has maintained perfect quiet. A bailer has been lowered to the original bottom of 3013 feet.

At the P. Welch well in the SE. corner of the NW. ¼ of NE. ¼ of Section 4, 11–23, the Pollock Brothers carried the hole down to approximately 4200 feet, and then plugged the hole back to approximately 3600 feet, where they are now endeavoring to develop an oil sand.

The International lease of the Union Oil Company, consisting of the SE. ¼ of the NW. ¼ of Section 4, has been the center of continuous activity, resulting in the abandonment of well No. 1 (old Coronation well), and well No. 2, and in the bringing in of two good flowing wells, No. 3 and No. 4, each developing an initial yield of over 3000 barrels per day.

In the outlying sections of the Sunset Field there have been a number of old wild cat wells abandoned during the past year, including the El Camino Oil and Development Company No. 1 well, Section 10, 11–23 (4800 feet deep); the Sunset Security Oil Company well, Section 29, 11–23 (4110 feet deep); and the Midas Oil Company No. 1 well, Section 28, 12–23 (3855 feet deep).

In each of the above cases the work of abandoning was done by wrecking and salvaging companies for the values present in the casing. Some oil shows were recorded in the logs of these widely separated wells, but during the drilling operations they were not considered as worth developing. Nevertheless in abandoning the wells care was taken to protect each recorded oil showing by cement plugs above and below.

It should be impressed upon the operators that when any well is abandoned, and especially a deep wild cat well, situated away from proven areas, this department desires to secure the old log books, casing records and all other matters of record for the purpose of filing where such records will be preserved and available. Often all such records are turned over to a wrecking firm for their use in bidding on the work. In this district these firms have been uniformly accommodating in preserving the books and drawings and delivering them to this office.

SECTION 1, 11–24.

Early in December, 1915, the Standard Oil Company acquired the old Monto Cristo property (NW. ¼ Section 1, 11–24) and immediately started to put the wells in shape by shutting off water and deepening.

In May, 1916, the Melita Oil Company took over the old Fulton Road Oil Company holdings in the SW. ¼ of Section 1, 11–24, and redrilled well No. 15 (old No. 38) immediately.

SECTION 12, 11–24.

The Good Roads Oil Company drilled two and the Petrolia Oil Company drilled three shallow wells on Section 12, 11–24 since March, 1916. An unexpected gas blowout encountered above the oil sands of the Good Roads well No. 3, resulted in a fire that destroyed the derrick.

SECTION 30, 12–23.

A serious water condition exists in the National Pacific No. 2 well on the south line of Section 30, 12–23 and in the offsetting K. T. and O. well No. 35 on Section 35, 12–23.

In early drilling the water strings were carried too deep in these wells passing through and shutting off the oil sands, later termed the Wilhelm sands. When the matter was referred to the General Petroleum Company, November 17, 1916, it was learned that recommendations had already been made by their field staff that the No. 2 National Pacific well be abandoned. We were referred to the federal receiver for action in the matter, as lease was then in his charge. When the problem was presented to the receiver and his local manager, we were informed that they had other work on which to use the money derived from the National Pacific oil sales. The K. T. and O. Company were willing and anxious to cooperate by working on their No. 35 well, as they desired to plug the bottom portion of the well and then test out the sand now correlated as the Wilhelm sand, in order to protect other wells producing from that sand.

SECTION 32, 11–23.

All of Section 32, 11–23 is operated under the supervision of Receiver H. M. Payne. This office has been advised by the state supervisor to cooperate with his field operators, and we have consistently endeavored to do so. But lack of time to thoroughly correlate the formations on the Maricopa flat has made it impossible to keep in touch with their operations.

The aim of the receiver as represented to this department has been to test out each well, locate the water troubles, if any, and redrill offending wells to correct water troubles.

This department has only been appraised of the work after its completion, so is not in a position to report on details of such.

SECTION 36, 12–24.

In drilling Ethel D. well No. 30 near the center of the 160-acre property in the SW. $\frac{1}{4}$ of Section 36, 12–23, a very heavy gas pocket was encountered at about 600 feet, which partially wrecked the rig. At the depth of 1140 feet a flowing oil sand was developed and the well has been producing at better than 600 barrels per day.

List of Oil Wells of Record in Sunset Field.

The following list of oil companies, holdings and recorded wells in Sunset Field, shows at a glance the extent to which each company has cooperated with this department in furnishing the desired logs and production reports.

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 4, 11-23—				
Kyle & Davies	1	----------	----------	Abandoned.
Hibernian	1	----------	----------	Abandoned.
Miocene	2	----------	----------	P. Welch abandoned; No. 3 redrilling.
Interstate	4	3	P	One drilling.
Lake View No. 2	4	4	P	
Union Oil Company, "International"	5	3	P	1 drilling; 1 aband.
Midway Fields Oil Company	2	----------	----------	
Union Oil Company, "Midway Fields"	2	----------	P	1 abandoned; 1 susp.
Union Oil Company, "Jergins"	1	1	P	
United Midway Oil Company	1	1	P	
Sec. 5, 11-23—				
Kern Trading and Oil Company	8	8	P	
Sec. 6, 11-23—				
General Petroleum Company, "Essex"	10	10	P	
Bankline Oil Company	4	4	----------	One suspended.
Maricopa National Oil Company	6	----------	----------	One abandoned.
Pacific Petroleum Company	2	----------	----------	One drilling.
G. P. Company, "American Sunset"	2	2	----------	One abandoned.
Pacific Petroleum Company, "Virginia"	2	----------	----------	One drilling.
G. P. Company, "Eclipse"	1	1	P	
Gen. Petroleum Company	1	1	----------	
Le Blanc Oil Company	2	----------	P	
Canadian Sunset Oil Company or Lady Washington Oil Company	1	1	----------	
Sec. 7, 11-23—				
Guarantee Oil Company	1	----------	----------	Abandoned.
Canadian Sunset Oil Company	1	----------	----------	
F. G. Munzer et al.	1	----------	----------	Abandoned.
Occidental Oil Company	3	----------	----------	Abandoned.
Johnson Oil Company	1	----------	----------	
Sec. 8, 11-23—				
Midland Southern Oil Company	2	----------	P	One suspended.
Bronco Oil Company	1	----------	P	
Maricopa Producers Oil Company	1	----------	----------	Water well.
Sunset Extension Oil Company	2	----------	----------	1 abandoned; 1 drill'g.
Sec. 10, 11-23—				
El Camino Oil Company	1	----------	----------	Abandoned.
General Petroleum Company, "Sunset"	1	1	P	Abandoned.
Barbour & Ripley Oil Company	1	----------	----------	Abandoned.
Sec. 12, 11-23—				
Esperanza Consolidated Oil Company	2	----------	----------	Abandoned.
Sec. 14, 11-23—				
Midland Oil Fields Company, Ltd. (A. O. F. Ltd.)	2	----------	----------	Abandoned.
Sec. 15, 11-23—				
Midland O. F. Co., Ltd. (A. O. F.)	1	1	P	
Sec. 17, 11-23—				
Western Minerals Company (N. ½)	2	----------	----------	Drilling.
Western Minerals Company (S. ½)	3	----------	----------	
Hazelton Crude Oil Company	2	----------	----------	One abandoned.
Sec. 18, 11-23—				
Johnson Oil Company	3	----------	----------	Abandoned.
Topaz Oil Company	3	----------	----------	
Union Oil Company	17	----------	----------	All abandoned.
Sec. 19, 11-23—				
Union Oil Company	4	----------	----------	Abandoned.

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 20, 11-23—				
Union Oil Company, "Navajo"	3			All abandoned.
Union Oil Co. vs. Maricopa Visalia	3			2 abandoned; 1 drill'g.
Sec. 21, 11-23—				
Western Minerals Company	7			Two abandoned.
Sec. 22, 11-23—				
Western Minerals Company	2			One abandoned.
Sec. 23, 11-23—				
Western Minerals Company	1			
Sec. 24, 11-23—				
Nevada Pacific Oil Company	4			2 drilling; 2 susp'd.
Sec. 25, 11-23—				
Western Minerals Company	1			
Sec. 26, 11-23—				
Western Minerals Company	1			
Sec. 27, 11-23—				
Western Minerals Company	1			Abandoned.
Sec. 28, 11-23—				
Western Minerals Company	1			
Sec. 29, 11-23—				
Sunset Security Company	2			Suspended.
Buick Oil Company	1			Suspended.
Sec. 30, 11-23—				
Buick Oil Company	1			Suspended.
Sec. 34, 11-23—				
Thirty Four Oil Company	1			Drilling.
Sunset Security Oil Company	1			Drilling.
Sec. 35, 11-23—				
G. P. Company, "El Centro"	1	1		
Western Minerals Company	1			
Sec. 1, 11-24—				
K. T. & O. Company	11	11	P	
Standard Oil Company, "Maricopa"	23	23	P	
Northern Oil Company	12			
Vancouver Midway Oil Company	2			One drilling.
Melita Oil Company (Fulton Road Oil Co.)	33			
Muscatine Oil Company	8			1 water well, 1 abandoned, 1 location.
Canadian Sunset Oil Company	4			2 abandoned;
Mohawk Oil Company	1			1 water well.
Sec. 2, 11-24—				
Ruby Oil Company	10			
McCray Bros. Oil Company	3			Abandoned.
Sunset Monarch Oil Company	6			One abandoned.
United Crude Oil Company	6			
Case Mineral and Petroleum Company	3			
McCutcheon Bros. Oil Company	8	6		
Sunset Monarch Oil Company	1			Abandoned.
El Rey Oil Company	1			Abandoned.
Occidental Oil Company	4			1 abandoned; 1 water well.
Sunset Monarch Oil Company	26			3 abandoned; 1 drill'g.
Ida May Oil Company	4			
Union Oil Company	3			All abandoned.
Midway View Oil Company	4			Two abandoned.
Adeline Read Oil Co. Consol. (S. ½)	7			
Adeline Read Oil Co. Consol. (N. ½)	19			Four abandoned.
Sec. 3, 11-23—				
Adeline Road Oil Co. Consol. (S. ½)	7			
Adeline Road Oil Co. Consol. (N. ½)	19			Four abandoned.
Union Oil Company	2			Abandoned.
Rio Oil Company	3			Abandoned.
Sec. 11, 11-24—				
Union Oil Company	1			Abandoned.
Sec. 12, 11-24—				
Union Oil Company	5			Abandoned.
Topaz Oil Company	1			
New Centre Oil Company	10			

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 12, 11-24—Continued.				
Walter Snook Oil Company	4			
Petrolia Oil Company	5		P	
Northern Oil Company	3	1		One water well.
Golden West Oil Company	3			One abandoned.
Consolidated Midway Chief Oil Company	4			
Sec. 12, 11-24—				
Good Roads Oil Company	11	6	P	1 abandoned; 1 water well.
Sec. 13, 11-24—				
Union Oil Company				16 wells abandoned.
Union Oil Company, E. ½ of NE. ¼	6			One abandoned.
Union Oil Company, "Monarch"	6			Five abandoned.
Union Oil Company, "St. Paul"	1			Abandoned.
Sec. 14, 11-24—				
White Etal Oil Company	1			Abandoned.
Sec. 15, 11-24—				
Mirson Oil Company	1			Abandoned.
Sec. 28, 12-23—				
Midas Oil Company	1			Abandoned.
Sec. 30, 12-23—				
Gen. Pet., "National Pacific," NE.	5	5		2 abandoned; 1 drill'g.
Gen. Pet., "National Pacific," SW.	5	5		1 drilling; 1 water well.
Sec. 31, 12-23—				
K. T. & O. Company	25	17	P	Two abandoned.
Sec. 32, 12-23—				
Maricopa Northern Oil Company	2			One abandoned.
National Pacific Oil Company	1			
Midway Northern Oil Company	6		P	Two abandoned.
Maricopa Consolidated Oil Company	1			One abandoned.
Midland Oil Fields (A. O. F., Ltd.)	6	6	P	1 water well; 1 aband.
Maricopa Oil Fields (A. O. F., Ltd.)	1	1		Abandoned.
California Amalgamated Oil Company	1			Abandoned.
El Dora Oil Company	3		P	One water well.
General Petroleum Oil Company	6	6	P	
Spreckels Oil Company	7		P	
Maricopa Star Oil Company	8		P	Two abandoned.
Pacific Midway Oil Company	7		P	1 abandoned; 1 drill'g.
Obispo Oil Company	3	1	P	
National Pacific Oil Company	2			One drilling.
Miocene Oil Company	3		P	One abandoned.
Sec. 32, 12-23—				
Trojan Oil Company	1		P	
Sec. 34, 12-23—				
Case Mineral and Petroleum Company	1		P	
Comstock Crude Oil Company	1			
Sec. 25, 12-24—				
K. T. & O. Company	10	10	P	Two abandoned.
Union Oil Company, "Lake View"	6		P	
Sec. 26, 12-24—				
Sunset Monarch Oil Company	15			Four abandoned.
Sec. 27, 12-24—				
Union Oil Company	1			Abandoned.
Sec. 28, 12-24—				
Union Oil Company	2			Abandoned.
Sec. 29, 12-24—				
Union Oil Company	2			Abandoned.
Sec. 32, 12-23—				
Gillette & McBride Oil Company	1			Abandoned.
Los Angeles Midway Oil Company	1			
Sec. 33, 12-24—				
Union Oil Company	4			Two abandoned.
Sec. 34, 12-24—				
Tannehill Oil Company	12		P	Shut down April 16, 1916.
Beaver Oil Company	3			Abandoned.
Union Oil Company	4			Abandoned.
Boston Pacific Oil Company	6			

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 35, 12-24—				
Union Oil Company, "Webster"	13	----------	----------	Three abandoned.
Union Oil Company, "Sage"	22	----------	----------	11 abandoned; 2 drill.
Union Oil Company, "Pacific"	2	----------	----------	Two abandoned.
Union Oil Company, J. B. & B.	16	----------	----------	Two abandoned.
Sec. 36, 12-24—				
Maricopa Thirty-six Oil Company	4	----------	----------	
M. & T. Oil Company	3	----------	----------	
M. J. & M. Consolidated Oil Company, "M. J."	4	4	P	
M. J. & M. Consolidated Oil Company, NE.	9	9	P	One abandoned.
Sec. 36, 12-23—				
M. J. & M. Consolidated, "M. & M."	8	8	P	One abandoned.
M. J. & M. Consolidated, SW.	16	16	P	One abandoned.
Ethel D. Oil Company	22	22	P	

KERN RIVER OIL FIELDS.

The service rendered by this department to the operators of the Kern River Oil Fields from September, 1915, to July 1, 1916, leaves much to be desired, as this field offers several very interesting problems and a splendid opportunity for a demonstration of the working possibilities of the department.

In beginning our work it was immediately evident that in order to properly handle the mere routine work of the Kern River Field it would be necessary to have an assistant stationed at Bakersfield, and the state oil and gas supervisor endeavored to locate an assistant on that work in December, 1915, but lack of funds made it impossible.

Accordingly it has been necessary for the Taft office to limit its work in this field almost entirely to formal testing of water shutoffs and the more important problems have been neglected for lack of time. In this work we were very greatly assisted by Mr. C. E. Ballagh, who accepted an appointment as special deputy supervisor, and gratuitously gave the department of his time when he could spare it from his regular duties, to make shutoff tests on numerous wells in the Kern River Field on occasions when the deputy was unable to make the trip from Taft. Mr. Ballagh is superintendent of the Amaurot Oil Company, Apollo Oil Company and the Four Oil Company, all in this field.

Seventy-eight new wells were drilled during this period and 60 of these were put down on the properties of the Associated Oil Company, the largest operator in this field. There were 69 wells redrilled or deepened and eight wells abandoned in this field.

Water situation.

To report on the water situation in the Kern River Oil Field at this time would not be fair either to the operators or to this department, as our findings to date have not been tabulated or studied except as individual problems including one well or possibly a group of nearby wells.

Enough study has been given the problem to state that the most important work of this department will be to impress upon many of the operators the importance of cooperation in their work of correcting the unfortunate water conditions in certain parts of that field, as well as preventing the spread of the water-soaked area. The present condition of many of the worst-flooded sections can be directly attributed to the lack of cooperation on the part of the early operators.

A superintendent on one of the many small leases may closely study the behavior of his wells and immediately exclude intrusive water in a manner that may seem satisfactory in every way to his wells, while it may in turn be the means of flooding a neighbor's well. Thus, in time the damage may return to the wells in his care through some other sands which have been penetrated by the wells of both properties.

With the wells drilled so close together, and some of the operators differing as to the proper depth on the formation to land the water strings, a very serious condition was certain to result. Again some of the water strings were landed in oil or tar sands and no test was made of the impossible shutoff. Then some of the wells were carried deep, into bottom water, and not properly shut off. Because of the resultant expense, some of these wells were then abandoned without plugging between each sandy formation.

This is a severe description of existing conditions in portions of the field and is not to be taken in any way as a standard of operations today in the Kern River Field, for such a reflection upon the present operators would be most unjust. But it is true in the extremes met with in the field, and in some cases represents a status that has existed for several years without systematic remedial work being attempted. To prescribe corrective measures would be an impossible undertaking without first being supplied with the existing records of all of the companies, the active assistance of each company, and the necessary staff in the department to work up the information when received. Granted such conditions, much can be accomplished and much benefit can be expected from the work.

This office plans to get many of the necessary drawings completed in the near future, so that it will be possible to review the problems in detail with the field superintendents or their engineers, preparatory to making any recommendations as to the possible remedial measures.

Decisions.

Following is a list of the wells passed on by this department between September, 1915, and July 1, 1916. (The figures DD–79 etc., refer to the report number.)

SECTION 5, 28–27.
DD–79. Redrill to shut off water, Standard well No. 1.
D–90. Shutoff, Standard well No. 1.

SECTION 15, 28–27.
DD–80. Redrill, Standard well No. 1.

SECTION 27, 28–27.
Letter, September 10, 1915. Shutoff, Standard well No. 1.
Letter, October 12, 1915. Test, Standard well No. 1.
D–3. Shutoff, Standard well No. 1.
Letter, September 6, 1915. Shutoff, Standard well No. 2.

SECTION 27, 28–27.
Letter, October 19th and 27th, re Standard well No. 1.

SECTION 36, 28–27.
DD–60. Redrill, oil string, Tejon Oil Company well No. 11.
DD–167. Abandon, Traffic Oil Company well No. 10.

SECTION 19, 28–28.
DD–183. Deepen and redrill, Traders Oil Company well No. 53.
DD–165. Abandon, Traders Oil Company well 54.
Form No. 113. June 19, 1916. Redrill and deepen, Traders well No. 54. Delayed until log received.
DD–200. Redrill and deepen, Traders well No. 54.
D–116. Shutoff, Traders Oil Company well No. 65.

SECTION 20, 28–28.
DD–42. Redrill, Yellowstone Oil Company well No. 5.
DD–82. Redrill, Yellowstone Oil Company well No. 2.

SECTION 28, 28–28.
May 30, 1916. Drill, Bankers Oil Company well No. 34.

SECTION 29, 28–28.
D–64. Shutoff, Associated well M. and S. No. 10.
DD–192. Abandon, Associated well No. 10 M. and S.
DD–185. Shutoff bottom water, Virginia Oil Company well No. 6.
DD–153. Redrill, Virginia Oil Company well No. 18.
DD–152. Redrill, Virginia Oil Company well No. 29.

SECTION 30, 28–28.
DD–148. Redrill, Associated Oil Company well No. 5.
Form No. 113. June 30, 1916. Drill Associated well G. and W. 10–A.
Form No. 113. June 30, 1916. Drill, Associated well G. and W. 11–A.
Form No. 113. June 15, 1916. Drill, Associated well No. 12–A.
Form No. 113. June 15, 1916. Drill, Associated well G. and W. No. 14–A.
Form No. 113. June 17, 1916. Drill, Associated well No. 15–A.
Form No. 113. June 17, 1916. Drill, Associated G. and W. well No. 16–A.
Form No. 113. June 30, 1916. Drill, Associated well G. and W. well No. 17–A.
Form No. 113. June 15, 1916. Drill, Associated well No. 20–A.
Form No. 113. June 17, 1916. Drill, Associated well No. 21–A.
Letter, September 25, 1915. Drilling, Associated, G. and W. well No. 24–A.
D–11. Shutoff, Associated well G. and W. well No. 24–A.
DD–45. Redrill and deepen, Associated "Hawkeye" wells, 1, 2, 3 and 4.
D–233. Shutoff, Bald Eagle Oil Company well No. 1–A.
DD–104. Redrill and deepen, Bald Eagle Oil Company well No. 2.
DD–128. Redrill, Bald Eagle Oil Company well No. 9.

SECTION 30, 28–28—Continued.

DD–105. Redrill and deepen, Bald Eagle Oil Company well No. 13.
DD–174. Abandon, Bald Eagle Oil Company well No. 13.
Form No. 113. June 30, 1916. Drill, Bald Eagle Oil Company well No. 13–A.
DD–103. Redrill and deepen, Bald Eagle Oil Company well No. 17.
DD–29. Deepen and redrill, Euclid Oil Company well No. 1.
Form No. 113. May 8, 1916. Drill, Euclid Oil Company well No. 8.
DD–191. Redrill and deepen, Nevada County Oil Company well No. 1.
DD–201. Redrill and deepen, Nevada County Oil Company well No. 4.
DD–117. Deepen, Nevada County Oil Company well No. 16.
DD–125. Deepen, Nevada County Oil Company well No. 19.
DD–126. Deepen, Nevada County Oil Company well No. 20.
DD–141. Abandon, Pacific Crude Oil Company well No. 3.
Form No. 113. May 8, 1916. Drill, Traffic Oil Company well No. 7.
DD–164. Abandon, Traffic Oil Company well No. 33.
DD–71. Redrill and deepen, Traffic Oil Company well No. 39.
DD–118. Redrill and deepen, Traffic Oil Company well No. 40.

SECTION 31, 28–28.

Form No. 113. February 18, 1916. Drill, Associated, Bear Flag No. 4.
D–124. Shutoff, Associated well No. 4, Bear Flag.
Form No. 113. February 19, 1916. Drill, Associated, Clarence No. 6.
D–109. Shutoff, Associated, Clarence well No. 6.
Form No. 113. February 22, 1916. Drill, Associated, Clarence No. 7.
D–110. Shutoff, Associated, Clarence well No. 7.
DD–143. Redrill, Associated well G. and W. No. 4.
DD–35. Redrill, Associated well G. and W. No. 6.
D–52. Shutoff, Associated well G. and W. No. 6.
D–28. Shutoff, Associated well G. and W. No. 9.
DD–36. Redrill, Associated well G. and W. well No. 12.
D–107. Shutoff, Associated G. and W. well No. 12.
Form No. 113. February 16, 1916. Drill, G. and W. No. 15. Associated.
D–108. Shutoff, Associated, G. and W. well No. 15.
Letter, September 25, 1915. Drilling, Associated H. and F. well No. 4.
Form No. 113. September 26, 1915. Drill (prospect hole), Associated H. and F. No. 4.
D–45. Shutoff, Associated well H. and F. No. 4.
Form No. 113. February 2, 1916. Test shutoff with 10″ casing, Associated H. and F. No. 4.
D–68. Shutoff, Associated H. and F. well No. 4.
D–221. Shutoff, Associated well H. and F. No. 4.
Form No. 113. June 15, 1916. Drill, Associated H. and F. well No. 5.
Form No. 113. June 15, 1916. Drill, Associated H. and F. well No. 6.
February 25, 1916. Drill, Associated, Queen Esther, well No. 4.
D–121. Shutoff, Associated, Queen Esther, well No. 4.
Letters, re Associated, Stirling, well No. 19.
Letter, October 11, 1915. Redrill, Associated well No. 19.
Letter, October 19, 1915. Shutoff, Associated well No. 21 Stirling.
DD–64. Redrill, Associated, Stirling, well No. 22.
Letter, February 20, 1916. Redrill, Associated Stirling well No. 26.
DD–10. Redrill, Associated Sycamore well, No. 2.
Form No. 113. January 26, 1916. Drill, Associated Sycamore well No. 9.
D–87. Shutoff, Associated Sycamore well No. 9.
Form No. 113. February 9, 1916. Drill, Associated Sycamore well No. 10.
D–96. Shutoff. Associated Sycamore well No. 10.
Form No. 113. February 8, 1916. Drill, Associated Sycamore well No. 11.
D–97. Shutoff, Associated Sycamore well No. 11.
Form No. 113. January 26, 1916. Drill, Associated Sycamore well No. 12.

SECTION 31, 28-28—Continued.

D-88. Shutoff, Associated Sycamore well No. 12.
Form No. 113. June 10, 1916. Drill, Associated Sycamore well No. 13.
Form No. 113. June 10, 1916. Drill, Associated Sycamore well No. 14.
Form No. 113. June 10, 1916. Drill, Associated Sycamore well No. 15.
Form No. 113. June 10, 1916. Drill, Associated Sycamore well No. 16.
Form No. 113. June 15, 1916. Drill, Associated Sycamore well No. 17.
Form No. 113. June 15, 1916. Drill, Associated Sycamore well No. 18.
D-99. Shutoff, Calex Oil Company well No. 4.
DD-151. Redrill, Calloma Oil Company well No. 7.
DD-121. Shut water off, Peerless Oil Company well No. 22.
Form No. 113. April 22, 1916. Make pumping test, Peerless well No. 22.
DD-50. Shutoff bottom water, Peerless Oil Company well No. 37.
DD-209. Redrill, Peerless Oil Company well No. 36.
D-180. Shutoff, Peerless Oil Company well No. 37.
DD-21. Plug off bottom water, Peerless Oil Company well No. 39.
Letter, October 26, 1915. Redrill, Peerless well No. 40.
DD-66. Redrill, Peerless Oil Company well No. 42.
Form No. 113. February 22, 1916. Test water shutoff, Peerless Oil Company well No. 42.
D-181. Test by pumping, Peerless Oil Company well No. 42.
DD-88. Redrill, Peerless Oil Company well No. 43.
DD-100. Test by pumping, Peerless Oil Company well No. 43.
D-182. Shutoff, Peerless Oil Company well No. 43.
DD-33. Redrill to shutoff water, Peerless Oil Company well No. 49.
DD-62. Redrill, Peerless Oil Company well No. 53.
D-183. Shutoff, Peerless Oil Company well No. 53.
DD-122. Redrill, Peerless Oil Company well No. 67.
Form No. 113. April 22, 1916. Make pumping test, Peerless well No. 67.
D-184. Shutoff, Peerless Oil Company well No. 67.
Form No. 113. February 28, 1916. Drill, Peerless Oil Company well No. 68.
D-120. Shutoff, Peerless Oil Company well No. 68.
D-170. Shutoff, Peerless Oil Company well No. 68.
April 26, 1916. Drill, Peerless Oil Company well No. 69.
D-171. Shutoff, Peerless Oil Company well No. 69.
May 23, 1916. Drill, Peerless Oil Company well No. 70.
D-256. Shutoff, Peerless Oil Company well No. 70.
DD-90. Redrill oil string only, Sovereign Oil Company well No. 1.
DD-34. Redrill Sovereign Oil Company well No. 8.
DD-133. Redrill, Vesta Oil Company well No. 15.

SECTION 32, 28-28.

DD-149. Redrill, Associated Kern well No. 27.
D-9. Shutoff, Associated well No. 34.
Form No. 113. March 31, 1916. Drill, Associated Kern well No. 35.
D-150. Shutoff, Associated Kern well No. 35.
Form No. 113. March 31, 1916. Drill, Associated Kern well No. 36.
D-152. Shutoff, Associated Kern well No. 36.
Form No. 113. April 10, 1916. Drill, Associated Kern well No. 37.
Form No. 113. April 12, 1916. Test water shutoff, Associated Kern well No. 37.
D-142. Shutoff, Associated Kern well No. 37.
Form No. 113. April 14, 1916. Drill, Associated Kern well No. 38.
D-159. Shutoff, Associated Kern well No. 38.
Form No. 113. March 31, 1916. Drill, Associated Kern well No. 39.
D-153. Shutoff, Associated Kern well No. 39.
Form No. 113. March 30, 1916. Drill, Associated Kern well No. 40.
D-155. Shutoff, Associated Kern well No. 40.
Form No. 113. March 21, 1916. Drill, Associated Kern well No. 41.

SECTION 32, 28–28—Continued.
Form No. 113. April 12, 1916. Test water shutoff, Associated Kern well No. 41.
D–126. Shutoff, Associated well No. 41.
Form No. 113. April 4, 1916. Drill, Associated Kern well No. 42.
D–154. Shutoff, Associated Kern well No. 42.
Form No. 113. April 11, 1916. Drilling, Associated Kern well No. 43.
D–160. Shutoff, Associated Kern well No. 43.
Form No. 113. March 21, 1916. Drill, Associated Kern well No. 44.
D–151. Shutoff, Associated Kern well No. 44.
Form No. 113. March 16, 1916. Drill, Associated Omar No. 10.
Form No. 113. April 12, 1916. Test water shutoff, Associated Omar No. 10.
D–125. Shutoff, Associated Omar well No. 10.
DD–106. Redrill, Illinois Crude Oil Company well No. 2.

SECTION 33, 28–28.
DD–12. Redrill oil string, Kern River Oil Fields well No. B–2.

SECTION 2, 29–28.
May 4, 1916. Drill, No. 15, Petroleum Development Company.

SECTION 3, 29–28.
Form No. 113. March 31, 1916. Drill, J. E. Gray Estate well No. 23.
D–137. Shutoff, J. E. Gray Estate well No. 23.
May 6, 1916. Drill, J. E. Gray Estate well No. 24.
D–178. Shutoff, J. E. Gray Estate well No. 24.
June 11, 1916. Drill, J. E. Gray Estate well No. 25.

SECTION 4, 29–28.
DD–56. Abandon, Associated Aztec well No. 9.
December 13, 1915. Drill, Associated Blinn well No. 3.
D–74. Shutoff, Associated Blinn well No. 3.
December 5, 1915. Drill, Associated Blinn well No. 4.
D–62. Shutoff, Associated Blinn well No. 4.
Form No. 113. November 24, 1915. Drill, Associated Gold Standard No. 3.
D–63. Shutoff, Associated Gold Standard well No. 3.
Form No. 113. December 4, 1915. Drill, Associated Gold Standard well No. 4.
D–40. Shutoff, Associated Gold Standard well No. 4.
Form No. 113. December 5, 1915. Drill, Associated Gold Standard well No. 5.
D–57. Shutoff, Associated Gold Standard well No. 5.
Form No. 113. December 5, 1915. Drill, Associated Gold Standard well No. 6.
D–46. Shutoff, Associated Gold Standard well No. 6.
Form No. 113. November 22, 1915. Drill, Associated Kern River Mutual well No. 4.
D–34. Shutoff, Associated Kern River Mutual well No. 4.
Form No. 113. November 22, 1915. Drill, Associated Wilson well No. 6.
D–32. Shutoff, Associated Wilson well No. 6.
January 11, 1915. Drill, Clampitt Oil Company well No. 15.
D–73. Shutoff, Clampitt Oil Company well No. 15.
Form No. 113. February, 1916. Drill, Clampitt Oil Company well No. 16.
D–98. Shutoff, Clampitt Oil Company well No. 16.
DD–51. Redrill, Kern Four Oil Company well No. 10.

SECTION 5, 29–28.
D–33. Shutoff, Associated well No. SJ–38.
D–26. Shutoff, Associated well No. SJ–39.
Form No. 113. May 22, 1916. Drill, Associated well No. SJ–40.
Form No. 113. May 18, 1916. Drill, Associated well No. SJ–41–N.
Form No. 113. May 18, 1916. Drill, Associated well No. SJ–42.
Form No. 113. May 6, 1916. Drill, Associated well SJ–43.
D–240. Shutoff, Associated well No. SJ–43.
Form No. 113. May 6, 1916. Drill, Associated well SJ–44–N.

SECTION 5, 29–28—Continued.
D–220. Shutoff, Associated well No. SJ–44.
Form No. 113. May 5, 1916. Drill, Associated well SJ–45.
D–219. Shutoff, Associated well No. SJ–45.
Form No. 113. May 5, 1916. Drill, Associated well SJ–46.
D–218. Shutoff, Associated well No. SJ–46.
Form No. 113. May 1, 1916. Drill, Associated well SJ–47–N.
D–217. Shutoff, Associated well No. SJ–47.
Form No. 113. May 1, 1916. Drill, Associated SJ–48–N.
D–230. Shutoff, Associated well SJ–48.
Form No. 113. April 27, 1916. Associated well SJ–49.
D–204. Shutoff, Associated well No. SJ–49.
Form No. 113. April 26, 1916. Drill, Associated well SJ–50.
D–199. Shutoff, Associated well No. SJ–50.
Form No. 113. April 26, 1916. Drill, Associated well SJ–51–N.
D–200. Shutoff, Associated well No. SJ–51.
Form No. 113. April 22, 1916. Drill, Associated well SJ–52.
D–179. Shutoff, Associated well SJ–52.
Form No. 113. April 25, 1916. Drill, Associated well SJ–53.
D–192. Shutoff, Associated well SJ–53.
Form No. 113. April 25, 1916. Drill, Associated well SJ–54.
D–193. Shutoff, Associated well No. SJ–54.
Form No. 113. February 22, 1916. Test water shutoff, Amaurot Oil Company well No. 2.
D–158. Shutoff, Del Rey Oil Company well No. 1.
DD–163. Redrill, Standard well No. 13, Monte Cristo.
DD-95. Redrill, Standard well No. 14.
DD–120. Redrill, Standard well No. 26.
DD–119. Redrill Standard well No. 33.
DD–101. Redrill, Standard well No. 41.
D–128. Shutoff, Standard well No. 41.
DD–93. Redrill, Standard well No. 53, Monte Cristo.
DD–94. Redrill, Standard well No. 55, Monte Cristo.
DD–22. Redrill, Standard well No. 67, Monte Cristo.

SECTION 6, 29–28.
DD–179. Redrill, Enos Oil Company well No. 14.

SECTION 8, 29–28.
DD–59. Redrill, Harris and Stevens Corp., Ltd, well No. 6.
D–194. Shutoff, C. C. Harris Company well No. 6.
DD–129. Redrill, Harris and Stevens well No. 7.
DD–142. Redrill, Homer Oil Company well No. 1.
Form No. 113. June 16, 1916. Drill, Prairie Oil Company well No. 3.
DD–85. Redrill, Thomas Montgomery well No. 3. (Cleveland Oil Company.)

SECTION 9, 29–28.
DD–86. Redrill oil string, Junction Oil Company well No. 2.
DD–24. Redrill, Junction Oil Company well No. 3.
D–222. Shutoff, Junction Oil Company well No. 5.
June 6, 1916. Drill, Petroleum Development Company well No. 5.
DD–127. Redrill, Section Five Oil Company well No. 4.

Notes Reviewing the Above Listed Operations.

SECTIONS 5, 15, 27, T. 28 S., R. 27 E.

The Standard Oil Company, in drilling a number of deep wild cat wells on Sections 5, 15, 21, 27 and 35, T. 28 S., R. 27 E., have had considerable difficulty in shutting off the top waters because of the lack of a suitable formation in which to cement the casing. It was necessary to make several attempts at cementing before satisfactory jobs were secured on three of the wells. After several years of discouraging work, it now appears as if they would begin to win a production from these wells.

SECTION 30, 28–28.

The Associated Oil Company drilled ten new wells on the Green and Whittier lease and deepened four wells on the Hawkeye lease as a part of the extensive drilling campaign being carried on by that company.

The Bald Eagle Oil Company redrilled four and drilled two new wells, while the Nevada County Oil Company deepened five wells.

SECTION 31, 28–28.

A review of the work accomplished on Section 31, 28–28 shows that 21 new wells were drilled and 20 old wells were deepened or redrilled during the past year.

Statement of Operations.

The Associated Oil Company drilled 18 and the Peerless Oil Company three of the new wells. Eight of the redrilling jobs were on Associated leases and ten were on the Peerless property. On the latter lease Mr. Wells has been very successful in shutting off bottom water by mudding up the offending lower sand under heavy pressure and then cementing. By this method, he has been able to double and treble the oil production and to reduce the quantity of water lifted by air from an excess of 1000 barrels to less than 75 barrels by pumping. Some contend that this is not a permanent cure of the water troubles and will result in an early flooding of the next higher oil sand, but not enough time has elapsed to definitely decide the question.

SECTION 32, 28–28.

The Associated Oil Company drilled eleven new wells on Section 32, 28–28.

SECTION 2 and 3, 29–28.

The Petroleum Development Company drilled one new well on Section 2 and the J. E. Gray Estate drilled three shallow wells on the south side of the river on Section 3, 29–28. This represents the work done on the east end of the field.

SECTION 4, 29–28.

Eight shallow wells were drilled on Section 4, 29–28 by the Associated Oil Company and the Clampitt Oil Company put down two new ones. The Clampitt Oil Company operates the old Denver and Michigan leases, formerly owned by the Atlantic Oil Company.

SECTION 5, 29–28.

On the San Joaquin lease of the Associated Oil Company, Section 5, 29–28, 17 new wells were drilled. After taking over the old Monte

Cristo property, the Standard Oil Company redrilled seven of the old wells in order to shut off water and improve the production. The Standard Oil Company started immediately to thoroughly overhaul that property and it is hoped that notable results will be accomplished in remedying the water conditions.

SECTIONS 8 and 9, 29–28.

The increase in the price of low gravity oil caused some activity on the river front in Sections 8 and 9, 29–28. Five wells were redrilled on Sections 8 and two on Section 9, while three new wells were drilled on the latter section.

Complaints Received from the Kern River Oil Field.

In October, 1915, the Associated Oil Company, the Amaurot Oil Company, the Del Rey Oil Company, and the Monte Cristo Oil Company, after making a series of tests, agreed that the source of the water troubles in the center of Section 5, 29–28 was one of two wells, Amaurot No. 2 or Del Rey No. 1. It was agreed that the top water should be shut off in both wells and this work was done. The Amaurot No. 2 well was placed on air and produced as much water as ever. The Del Rey well remained suspended.

Formal complaint was later made against the Del Rey Oil Company. Because of the fact that this well was originally drilled some 200 feet deeper on the formation than the adjoining wells, it was claimed that it was the source of bottom water flooding. After a number of conferences between the interested companies and the deputy supervisor, the Del Rey Oil Company started to redrill the well. The top water was tested and found dry. The well will be redrilled to the clay formations above the lower sands, where the old casing will be shot, and a cement plug will be placed in the hole after mudding the lower sand. It is being cemented at the present time, September, 1916, so that it is too early to determine whether this work will effectually shut the water off from the others.[1]

The Associated Oil Company, the Alma Oil Company, and the Petroleum Development Company have jointly placed before this deaprtment the water conditions existing in the SE. $\frac{1}{4}$ of Section 4, for arbitration. Each company recently furnished this department with copies of the logs of the wells, and work will be undertaken immediately to locate if possible the source of the water troubles or determine what tests would be of service in ascertaining the facts desired.[2]

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[1] Since the manuscript went to the printer the remedial work has been completed and greatly increased the oil production of both properties and also decreased the amount of water pumped. This case is striking proof of the possibility of profitably repairing old wells.

[2] The investigation has been completed since the manuscript went to the printer and it seems fairly certain that effective and profitable repairs can be made.

Numerous other informal complaints have been made, but in each case the complaining company refrained from making a written complaint, trusting that conditions could be improved without such action. In investigating the facts of some of these complaints, a willingness to cooperate in any work tending to improve the water conditions was met with and usually some tests were undertaken to prove or disprove the basis of the complaint.

RECORDS RECEIVED.

The following list of oil companies and holdings in the Kern River Field shows the number of wells of record in this office on June 30, 1916, and shows the extent to which the various companies have cooperated with this department in furnishing the logs and production reports requested:

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 24, 28-27—				
Sapphire Oil Company	1			Abandoned.
Petroleum Development Company	1			Abandoned.
S. P. Wible	1			Abandoned.
Oklahoma Oil Company	3			Abandoned.
Century Oil Company	1			Abandoned.
Oakland Oil Company	2			
Oakland Water Company	4			Abandoned.
Sec. 25, 28-27—				
Provident Oil Company	3			One water well.
Fox and Garrett, "Sturgeon"	1			
Jewell Oil Company	12			
Los Angeles Oil Company, "Kern"	4			
Fox & Garrett, "Vanderlip"	8			
Sec. 36, 28-27—				
Kern River Drillers	3			Idle.
Kern Union Oil Company	5			
Kern Central Oil Company	3			
Tejon Oil Company	10			
Metropolis Oil Company	2			One abandoned.
M. P. Oil Company	4			
Traffic Oil Company, "Melevan"	4			
Sec. 19, 28-28—				
Kern River O. F. of Cal., Ltd.	22			
Minnehaha Oil Company	6			Idle.
Exploration Oil Company	6			
Traffic Oil Company, "Olemo"	8			
Traders Oil Company	18	3		
Mecca No. 2 Oil Company	8			Three water wells.
Sec. 20, 28-28—				
Merchants and Bankers Oil Company	6			Three abandoned.
Pyramid Oil Company	3			Two abandoned.
H. H. Fish Oil Company	3			One abandoned.
Boston Petroleum Company	18			Three abandoned.
Yellowstone Oil Company	9			
Sec. 21, 28-28—				
Ojai Valley Petroleum Company	13			
Melwood Petroleum Company	4			
A. Pollock	6			
Sec. 22, 28-28—				
Caledonian Oil Company	1			
Hibernian Oil Company	1			Abandoned

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 28, 28-28—				
Bankers Oil Company	40	1	----------	
Stauffer Oil Company	13	----------	----------	
Associated Oil Company, Reed	14	14	P	
Associated Oil Company, Comet	7	6	P	
Overland Oil Company	23	----------	----------	
Sec. 29, 28-28—				
El Dorado Oil Company	2	----------	----------	
Continental Oil Company	2	----------	----------	
M. C. Parker	11	----------	----------	
Pricewell Oil Company	9	----------	----------	
Patricia Oil Company	10	----------	----------	
American Crude Oil Company	9	----------	----------	
Potomac Oil Company	12	----------	----------	
Virginia Oil Company	7	----------	P	
Mecca Oil Company	13	----------	----------	
Alva Oil Company	5	----------	----------	
Associated Oil Company, Gillelen	4	4	P	
Associated Oil Company, Columbian	13	13	P	
Associated Oil Company, Vernon	10	9	P	
Associated Oil Company, M. & S.	10	10	P	
Associated Oil Company, Hecla	3	3	P	
Associated Oil Company, Bolena	7	7	P	
Associated Oil Company, Canfield	41	24	P	
Associated Oil Company, Missouri	7	6	P	
Associated Oil Company, Richmond	5	5	P	
Linda Vista Oil Company	9	----------	----------	
Sesnon Oil Company	16	----------	----------	
E. P. T. Oil Company	5	----------	----------	
Piedmont Oil Company	8	----------	----------	
Sec. 30, 28-28—				
A. O. Co., G. & W.	9	9	P	
A. O. Co., G. & W., Jacalitas	2	1	----------	
A. O. Co., G. & W., Orient	5	5	P	
A. O. Co., G. & W., Chicago Crude	10	8	P	
A. O. Co., G. & W., Kern C. and Dev.	2	2	----------	
A. O. Co., G. & W., Luck No. 2	5	5	P	
A. O. Co., G. & W., Lorenzo	7	7	P	
A. O. Co., G. & W., Irma, Moneta, Hawkeye	8	8	P	
A. O. Co., G. & W., Toltec	6	6	----------	
Mt. Diablo Oil Company	5	3	----------	
Pacific Crude Oil Company	15	----------	----------	
Bald Eagle Oil Company	19	----------	----------	
Nevada County Oil Company	26	4	----------	
Federated Oil Company	15	----------	----------	
Traffic Oil Company	16	----------	----------	
Wrenn Oil Company	6	----------	----------	
Sec. 31, 28-28—				
Associated Oil Co., Hanford—F	3	3	P	
Associated Oil Co., Sycamore	8	8	P	
Associated Oil Co., Clarence B.	6	6	P	
Associated Oil Co., Queen Esther	3	3	----------	
Associated Oil Co., Senator	12	12	P	
Associated Oil Co., Bear Flag	3	3	P	
Associated Oil Co., G. & W.	13	13	P	
Associated Oil Co., Sterling	48	48	P	
Calloma Oil Company	12	----------	----------	
Vesta Oil Company	16	----------	P	
Sovereign Oil Company	11	----------	P	
Peerless Oil Company	73	----------	P	
Sec. 32, 28-28—				
Associated Oil Co., Kern—A	29	29	P	
Associated Oil Co., Reed—A	18	18	P	
Associated Oil Co., Kern	34	34	P	
Associated Oil Co., Omar	9	9	P	
Associated Oil Co., Reed Crude	19	19	P	
Standard Oil Company, West Shore	29	26	P	

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 32, 28-28—Continued.				
Illinois Crude Oil Company	11	----------	P	
Claremont Oil Company	14	----------	P	
Sec. 33, 28-28—				
Kern River Oil Fields of California, Ltd.	272	1	P	
Sec. 34, 28-28—				
Associated Oil Company, Reed Crude	10	10	P	
Sec. 2, 29-28—				
Petroleum Development Company	14	----------	P	
Gray Oil Company	22	----------	----------	
Sec. 3, 29-28—				
Kern Trading and Oil Company	261	261	P	
J. E. Gray Estate	26	----------	----------	
Petroleum Development Co., Elwood	12	----------	P	
Petroleum Development Company	37	----------	P	
Sec. 4, 29-28—				
Petroleum Development Company	37	33	P	
Revenue Oil Company	16	----------	P	
Michigan Atlanta Oil Company	6	----------	----------	
Denver Oil Company	6	----------	----------	
Alma Oil Company	13	----------	----------	
Kern River Oil Company	14	----------	----------	
Alma Jr. Oil Company	13	----------	----------	
Kern Four Oil Company	26	1	P	
Kern Four Oil Company, Black Jack lease	15	----------	P	
Knob Hill Oil Company	38	----------	----------	
East Puente Oil Company	11	----------	P	
Apollo Oil Company	22	----------	----------	
Four Oil Company	10	----------	----------	
Associated Oil Co., Central Pet.	34	34	P	
Associated Oil Co., Red Bank	18	18	P	
Associated Oil Co., Wolverine	19	19	P	
Associated Oil Co., Aztec	11	11	P	
Associated Oil Co., Wilson	5	5	P	
Associated Oil Co., Famosa	6	6	P	
Associated Oil Co., Kern River Mutt	3	3	P	
Associated Oil Co., Blinn	4	4	P	
Associated Oil Co., Gold Standard	3	3	P	
Sec. 5, 29-28—				
South Kern Oil Company	6	----------	----------	
Del Rey Oil Company	13	----------	----------	
Amaurot Oil Company	8	1	----------	
Standard Oil Company, Monte Cristo	75	60	P	
Associated Oil Company, San Joaquin	39	39	P	
Sec. 6, 29-28—				
Aurora Oil Company	9	----------	----------	
Enos Oil Company	23	1	----------	
Skockum Oil Company	1	----------	----------	
Colin Stewart	1	----------	----------	
Kern American Oil Company	1	----------	----------	
Sec. 8, 29-28—				
Peerless Oil Company	2	----------	----------	
Rio Bravo Oil Company	1	----------	----------	
Prairie Oil Company	3	1	----------	
Montgomery Oil Company	4	----------	----------	
Ohio Crude Oil Company	9	1	----------	
Sec. 9, 29-28—				
Junction Oil Company	15	4	----------	
Section Five Oil Company	7	----------	----------	
Capital City Oil Company	3	----------	----------	
King Oil Company	5	----------	----------	

McKITTRICK OIL FIELD.

This old field, with its many wells closely drilled along a narrow strip approximately four and one-half miles long in a northwest-southeasterly trend and less than one-half mile in width, continues to make a steady daily production of approximately 9,000 barrels.

The water conditions in this field form a very serious problem because of the following facts:

(1) In many of the early wells no effort was ever made to effect a shutoff of the top waters.

(2) Some of the wells were carried too deep and into the bottom water, and were not properly plugged.

(3) With the above conditions existent, occasional wells have been abandoned because of troubles incurred, or lack of production, without first plugging off the sands. These holes in turn serve as water courses to flood the various formations penetrated.

Most of the producing wells of this field make water, many of them a high percentage. This field warrants an extensive and thorough study of the water conditions, and such a work was planned months ago. The cooperation of some of the larger companies was promised but nothing has been accomplished to date because of the shortage of help in this office. Some routine progress has been made in collecting the logs of various wells and securing the production reports from some of the operating companies, thereby recording the water percentage on the wells reported.

As soon as the personnel of the Taft office is increased to the point where clerical work does not monopolize most of the time of the deputy, cross sections will be constructed, water conditions will be tabulated, and then with the assistance of the operators, an effort will be made to locate the offending wells.[3]

The McKittrick Field suffered a greater percentage of loss of rigs than other fields during the two destructive wind storms of January, 1916. In addition to the actual damage and loss sustained to the surface improvements, a substantial loss in production resulted from the wrecking of the derricks of so many pumping rigs.

No formal complaints have been received from the operators of the McKittrick Field. They have freely discussed the wells on their own properties that might need remedial work, and expressed a desire to cooperate in any general movement to exclude the water from the wells of the field, where possible to do so. Several of the superintendents believe that certain portions of the field would not justify the expense of repairing the many defective wells. It may be possible that a fewer number of wells are responsible for flooding of the sands than most operators consider offenders at this time.

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[3] The necessary increase in the engineering staff has been made since the manuscript was sent to the printer.

List of Oil Wells of Record in McKittrick Field.

The following list of oil companies, holdings and recorded wells in the McKittrick Field, shows at a glance to what extent each company has cooperated with this department in furnishing the desired logs and production reports:

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 13, 29-20—				
Juanita Oil Company	1	----------	----------	Drilling.
Sec. 25, 29-20—				
Sunshine Oil Company	1	----------	----------	
Sec. 36, 29-20—				
Shear Petroleum Co., Temblor Ranch	7	----------	----------	
California King Oil Company	5	----------	----------	
Shear Petroleum Co. or Dillon Oil Co.	3	----------	----------	
Shear Petroleum Company	2	----------	----------	One drilling.
St. Joe Oil Company	1	----------	----------	Drilling.
Warren Oil Company	1	----------	----------	Drilling.
Sec. 21, 29-21—				
Standard Oil Company	----------	----------	----------	
Sec. 22, 29-21—				
Standard Oil Company	----------	----------	----------	
Sec. 25, 29-21—				
Oakland McKittrick Oil Company	1	----------	----------	Abandoned.
Sunbeam Oil Company	----------	----------	----------	
Sec. 26, 29-21—				
H. S. Williams Oil Company	4	1	P	Three drilling.
United Western Oil Company, Successus	1	----------	----------	Drilling.
U. W. Company, Arcata	1	----------	----------	Drilling.
Sec. 27, 29-21—				
Standard Oil Company, M'y Premier	1	----------	----------	
Sec. 29, 29-21—				
Los Angeles McKittrick Oil Company	2	----------	----------	1 abandoned; 1 water well.
Sec. 31, 29-21—				
M. Z. Elliott Oil Company	1	----------	----------	Abandoned.
Sec 32, 29-21—				
Miller & Lux	1	----------	----------	Idle.
Jones Oil Company (1908)	1	----------	----------	Abandoned.
Associated Oil Company	1	1	----------	Abandoned.
Sec. 35, 29-21—				
Leader Oil Company	1	----------	----------	Abandoned.
Sec. 35, 29-21—				
Miller & Lux (old 1908 A. C. Macon prop.)	1	----------	----------	Idle.
Sec. 36, 29-21—				
Standard Oil Company, McPhee	1	----------	----------	Drilling.
West Penn. Company, Inc., Mohaska	2	1	----------	One drilling.
Sec. 32, 29-22—				
Petroleum Producers Company	1	----------	----------	Abandoned driller.
Sec. 1, 30-21—				
McKittrick Oil Company	3	----------	----------	Idle.
Sec. 2, 30-21—				
Research Oil Company	3	----------	----------	Idle.
Everett Oil Company	1	----------	----------	Idle.
Everett Oil Company, Little Standard	1	----------	----------	Idle.
Leader Oil Company	1	----------	----------	Abandoned.
Jackson Oil Company	2	----------	----------	Susp., abandoned.
Result Oil Company	2	----------	----------	Abandoned.

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 3, 30-21—				
Result Oil Company	2			Abandoned.
Miller & Lux, Belcher	1			Abandoned.
Miller & Lux, Puritan	1			Abandoned.
J. M. Smith	1			Abandoned.
Associated Oil Company	2			Abandoned.
Sec. 10, 30-21—				
Everett Oil Company	1			Abandoned.
North End Oil Company	1			Abandoned.
J. M. Smith, Miley	1			Abandoned driller.
G. Kinkaid, Carolina	1			Abandoned.
McKittrick Operators Company	1			Abandoned.
Sec. 11, 30-21—				
Josephine Oil Company				New.
Merrill Oil Company	3			Abandoned.
Madison Oil Company	3			Abandoned.
Everett Oil Company	4			Abandoned.
East Puente Oil Company No. 2	4			Two abandoned.
East Puente Oil Company, Kern	1			Abandoned.
East Puente Oil Company, King	1			Abandoned.
East Puente Oil Company	15		P	
Kern Trading Oil Company	3	2	P	Two abandoned.
Jackson Oil Company	8	6		One abandoned.
Associated Oil Company, Giant	8	8	P	One abandoned.
Reward Oil Company	13			
Sec. 12, 30-21—				
McKittrick Oil Company	7			Six abandoned.
K. T. & O. Company	21	21	P	Two abandoned.
A. O., California Standard	2	1	P	
Sec. 13, 30-21—				
A. O. Co., California Standard	4	3	P	
A. O. Co., Giant	9	9	P	One water well; 3 abandoned.
A. O. Co., Del Monte	38	34	P	Seven abandoned.
C. J. Oil Company or Berry & Keller	15	15	P	One abandoned driller.
K. T. & O. Company	21	21	P	Three abandoned.
Reward Oil Company	28	2		One abandoned.
Jewett Oil Company	14			Four abandoned.
Kern River Oil Company	4			Two abandoned.
Olig Crude Oil Company	5		P	
Sec. 14, 30-21—				
K. T. & O. Company	4	2		All water wells.
San Francisco McKittrick O. Co.	18			
Sec. 6, 30-22—				
Pittsburg Oil and Gas Company (Nacirema Oil Company)	1			Drilling.
Standard Oil Company, McKittrick	1			Drilling.
S. O. Co., Oakland McKittrick	1			Abandoned.
S. O. Co., Sea Breeze	2			Abandoned.
S. O. Co., M. Fox	1			Abandoned.
U. S. Oil and Mining Co., NW	10			Idle; 3 abandoned.
Sec. 7, 30-22—				
Standard Oil Company, McKittrick	1			Abandoned.
Sec. 8, 30-22—				
Standard Oil Co., McKittrick Extension	1			
S. O. Co., S. P. Wible	2			Abandoned.
Burns Oil Company	1			Abandoned.
Sec. 10, 30-22—				
Petroleum Producers Company	1			Abandoned.
Globe Exploration Company	1			Abandoned.
Sec. 16, 30-22—				
Fearless Oil Company	3			All abandoned.
Sec. 18, 30-22—				
McKittrick Extension Oil Company	2			Abandoned.
San Souci Oil Company	5			Abandoned.
Whittier Oil Company	1			Abandoned.
Associated Oil Company, Del Monte	6	5	P	

Name of company and lease	Number of wells shown on maps	Number of logs received	Production reports received	Remarks
Sec. 18, 30-22—Continued.				
McKittrick Oil Company	5			Four abandoned.
Cousins Oil Company	6			All abandoned.
I. X. L. Oil Company	5			All abandoned.
Sec. 19, 30-22—				
Associated Oil Company, Del Monte	16	16	P	
Fairfield Oil Company	10			Five abandoned.
State Consolidated Oil Company	13			
Associated Oil Co., W. Development	4	3	P	
Associated Oil Co., Giant, SW.	3	2	P	One drilling.
Associated Oil Co., Shamrock	8	8	P	Two abandoned.
Kern Trading and Oil Company	1			Abandoned.
A. O. Co., W. Development Co.	3	2	P	Abandoned.
A. O. Co., Giant	3	3	P	Abandoned.
A. O. Co., Arequipa	1	1		Abandoned.
A. O. Co., California Standard	6	6	P	One abandoned.
Virginia Crude Oil Company	6			All abandoned.
Twenty Oil Company	2			All abandoned.
Kern Trading and Oil Company	12	12	P	All abandoned.
Sec. 26, 30-22—				
W. Morris Land and Oil Company	1			Abandoned.
Sec. 27, 30-22—				
S. P. Railroad	2			Abandoned.
Sec. 28, 30-22—				
Associated Oil Company	3			Abandoned.
Associated Oil Company, Sterling	3	2		Abandoned.
Tulare Oil and Mining Company	2			Abandoned.
P. E. Bowles	3			Abandoned.
Sec. 29, 30-22—				
Midway Royal Petroleum Company	19	9	P	Nine abandoned.
Commonwealth Oil Company	1			Abandoned.
Shale Basin Oil Company	2			Abandoned.
Sec. 30, 30-22—				
Yancy Oil Company	1			Abandoned.
Sec. 34, 30-22—				
Belgian Oil Company	3			Idle.
Associated Oil Company, 1901	3			Abandoned.
J. E. O'Donnell, Monarch	2			Abandoned.
Sec. 35, 30-22—				
S. P. R. R.	1			Abandoned.

McKittrick Front.

The past year witnessed a very considerable change in the operating conditions on the McKittrick Front. It has been a transition from a number of idle wells and deserted camps, to a busy little field with several strings of tools running and almost every lease actively preparing to commence development work if not already doing so.

Many of the leases have changed hands. Some of the principal new holdings include:

T. 29 S., R. 21 E.—

Section 21. To the Standard Oil Company, SE. $\frac{1}{4}$, 160 acres.

Section 22. To the Standard Oil Company, S. $\frac{1}{2}$ of SW. $\frac{1}{4}$ and NW $\frac{1}{4}$ of the SE. $\frac{1}{4}$, 120 acres.

Section 27. To the Standard Oil Company, NW $\frac{1}{4}$ and S. $\frac{1}{2}$ of NE. $\frac{1}{4}$, 240 acres.

Section 26. To the H. S. Williams Oil Company, SE. ¼ of NE. ¼ and E. ½ of the SE. ¼, 120 acres.

(This company is operated under the same management as the Pacific Crude Oil Company of the Midway Field.)

Section 26. To the United Western Oil Company, NE ¼ of SW. ¼ (formerly Arcata Oil Company), and SW. ¼ of SE. ¼ (formerly Successus Oil Company).

Section 26. To R. B. Blodgett, NW. ¼ of SW. ¼ and SE. ¼ of SW. ¼ NW. ¼ of SE. ¼, 120 acres.

Section 25. To the Sunbeam Oil Company, S. ½ of SW: ¼, 80 acres.

Section 36. To the Standard Oil Company, N. ½ of N. ½ and SW. ¼ of NW. ¼, and SE. ¼ of NE. ¼, and SW. ¼, and W. ½ of SE. ¼, 480 acres, known as the McPhee lease.

Section 36. To the West Penn. Company, Inc., SE. ¼ of NW. ¼ and SW. ¼ of NE. ¼, 80 acres, formerly Mahaska lease.

T. 30 S., R. 22 E.:

Section 6. To the Pittsburg Oil and Gas Company, NE. ¼, 160 acres.

Section 6. To the Standard Oil Company, N. ½ of NW. ¼, and W. ½ of SW. ¼ of NW. ¼, and E. ½ of SE. ¼ of NW.¼ of SE ¼, and all of SE. ¼ except W. ½ of NE. ¼ of SE. ¼, 420 acres.

Section 7. To the Standard Oil Company, NW. ¼ of NW. ¼, more than 40 acres, tract formerly owned by the McKittrick Oil Company.

Section 8. NW. ¼ and S. ½, 480 acres.

In several cases the operators carrying on development work on the McKittrick Front have encountered considerable trouble in trying to correlate the sands and oil measures, and in shutting off the water in both the new wells and the old wells, which were improperly finished. Most of the leases in that section of the McKittrick Field have drilled one or more old wells in which the water had never been shut off.

Some of the present difficulties have resulted from the lack of complete and correct records of the formations and casing in the old wells. The importance of a carefully recorded formation log and casing record is never more forcefully brought to an operator's attention than when he takes over a partially developed property with some of the wells not properly finished.

List of Wells in the McKittrick Field Passed on by this Department During the Last Fiscal Year.

SECTION 36, 29–20 (*a*).

June 29, 1916. Drill, Shear Petroleum Company well No. 12.

SECTION 26, 29–21.

Form No. 113. April 22, 1916. Drill, H. S. Williams Oil Company well No. 9.

Form No. 113. May 30, 1916. Drill, H. S. Williams Oil Company well No. 17.

SECTION 36, 29–21.

March 17, 1916. Drill, Standard Oil Company McPhee lease well No. 1.

(*a*) The Shear Petroleum Company commenced drilling well No. 12 on June 29, 1916. This company is operating the old Templor Ranch Oil Company and the Dillon Oil Company holdings, located five miles northwest of Reward post office and six miles due west from the McKittrick Front developments on Section 36, 29–21.

SECTION 11, 30–21.
Form No. 113. April 8, 1916. East Puenta Oil Company lease No. 2 well No. 2.
D–146. Shutoff, East Puenta Oil Company well No. 2.
June 1, Drill, East Puenta Oil Company well No. 3.
D–234. Shutoff, East Puenta Oil Company well No. 3.
November 17, 1915. Drill, Jackson Oil Company well No. 5.
D–206. Shutoff, Jackson Oil Company well No. 5.
Form No. 113. March 16, 1916. Drill, Jackson Oil Company well No. 6.
May 14, 1916. Shutoff, Jackson Oil Company well No. 6.
May 24, notice to drill new well, Jackson Oil Company No. 7.

SECTION 12, 30–21.
Letter, October 11, 1915. Redrill, K. T. and O. well No. 129.
DD–3. Redrill, K. T. and O. well No. 141.
D–10. Shutoff, K. T. and O. well No. 141.
DD–57. Abandon, K. T. and O. well No. 124.

SECTION 13, 30–21.
DD–53. Abandon, Associated well No. 12 (Del Monte Lease).
DD–54. Abandon, Associated well No. 36 (Del Monte Lease).
DD–55. Abandon, Associated well No. 37 (Del Monte Lease).
DD–17. Deepen, Berry and Keller well No. 5.
DD–46. Deepen, Berry and Keller well No. 5.
DD–58. Deepen, Berry and Keller well No. 7.
D–95. Shutoff, Berry and Keller well No. 7.
DD–155. Redrill, Berry and Keller well No. 12.
D–205. Shutoff, Berry and Keller well No. 12.
DD–204. Redrill, Berry and Keller well No. 13.
D–215. Shutoff, Reward Oil Company well No. 20.
Form No. 113. March 31, 1916. Drill, Reward Oil Company well No. 41.
DD–138. Cement with 10″ casing, Reward Oil Company well No. 41.
D–161. Shutoff, Reward Oil Company well No. 41.

SECTION 6, 30–22.
May 10, 1916. Drill, Standard Oil Company well No. 1.
D–225. Shutoff, Standard Oil Company well No. 1.

SECTION 19, 30–22.
November 26, 1915. Drill, Associated Oil Company Giant Lease No. 52.
D–43. Shutoff, Associated well No. 52, Giant Lease.
November 27, 1915. Drill, Associated Oil Company No. 53, Giant Lease.
D–56. Shutoff, Associated well No. 53, Giant Lease.
DD–13. Abandon, Associated well No. 5, Shamrock Lease.
DD–14. Redrill, Associated well No. 7, Shamrock Lease.
D–84. Shutoff, Associated well No. 7, Shamrock Lease.
December 3, 1915. Drill, Associated well W. D. No. 1.
D–49. Shutoff, Associated well No. 1 W. D. Lease.
December 3, 1915. Drill, Associated W. D. well No. 2.
D–44. Shutoff, Associated well No. 2. W. D. Lease.
December 3, 1915. Drill, Associated well W. D. No. 3.
D–83. Shutoff, Associated well W. D. No. 3.
Form No. 113. March 28, 1916. Drill, Associated W. D. No. 4.
D–169. Shutoff, Associated well No. W. D. No. 4.

Section 29, 30–22.

April 3, 1916. Drill, Midway Royal Petroleum Company well No. 1. (New No. 1, old No. 1 abandoned.)

Reviewing the above listed operations, we note that 18 new wells were drilled in the entire McKittrick Field between October, 1915, and July 1, 1916. Six of these wells are on the McKittrick Front leases. Seven wells were redrilled or deepened and five were abandoned.

CHAPTER IV.

LOS ANGELES, ORANGE AND VENTURA COUNTY OIL FIELDS.

By Robt. B. Moran, Deputy Supervisor.

EAST COYOTE.

The East Coyote Field lies in a detached group of low hills which are the easterly extention of the Coyote hills and extend into the flats to the east for a distance of about a mile. The development of the topography of these hills is fairly mature, while the Coyote hills are but slightly cut except by one strong stream, which makes its way across the west end. The eastern hills are deeply eroded, notwithstanding the fact that all the streams in them have small water beds. There is one conspicuous ridge which bears southwesterly from the center of the field. The producing territory covers the end of this ridge, but does not follow along it. A number of deep wells have been drilled out in this direction and the reason was probably because this topographic feature was mistaken for the axis of the anticlinal uplift. There are 1100 acres of proven land with 96 producing wells, with a production of 300,000 barrels for the month of July, 1916.

Geology.

The producing measures are presumably of the same geologic age as the West Coyote Field. The producing zone is 300 to 600 feet in thickness. It is made up of brown sandy shale and oil sand; some of the sands are coarse.

The structure is anticlinal. There are many good exposures on the south line, showing a dip of about 20 degrees, though but little evidence of north dip can be obtained from surface out-crop of beds. A section N. 25° E. through the center of the field shows the top of the producing zone to rise from 2974 feet below sea level to 2550 feet on top of the arch and drop to 3046 feet on the north side. There is a sharp steepening at the edge of the field on both sides. In a number of places this is so rapid that it might well be interpreted as a fault. All the wells are drilled nearly down to the oil sand with a rotary so that little can be learned from logs about the upper formations. This makes such questions as this difficult to solve.

A section across the east end of the field through the St. Helens and Colokla properties, shows a fairly uniform southerly dip of the oil zone from about 2400 feet below the sea level. However, drilling farther to the north in this vicinity may disclose a dip in that direction. A number of dry holes have been drilled in the La Habra Valley syncline, to a depth of 1300 to 4600 feet.

Water Conditions.

The field is, at present, producing about 40,000 bbls. of water per month; 27,000 bbls. of this is coming from 10 wells. The property of the Petroleum company is the only one entirely free from water. This property is near the highest part of the anticlinal uplift near the center of the field.

During the past year much activity has been shown in the west third of the field. Considerable care has been exercised in the matter of shutting off water, with results which are fairly satisfactory. Eighteen wells showed a production of 144,000 bbls. of oil and 1800 bbls. of water for the month of July.

Wells in both the east and west end of the field have been drilled into water sand underlying the producing zone, but have been successfully plugged. A deep well now drilling in the northeast part of the field, reports water sand from 3870 to 4180 feet.

WEST COYOTE.

The West Coyote Field occupies a range of outlying hills on the south side of La Habra Valley. The highest point is 610 feet above sea level and about 300 feet above the floor of the valley. There are about 700 acres of proven land, with 46 producing and 6 abandoned wells. Structurally it is an anticlinal uplift which corresponds roughly with the topographic features. It is in fact one of the most striking examples of accumulation of oil in a quaquaversal in California. In out-crop the beds are seen to dip from 10 to 20 degrees and the strike swings almost around the entire compass.

The main oil zone is about 300 feet in thickness and is made up of shale and sandy shale and sand. This zone lies in depth of 2900 to 3200 feet below sea level in the center of the dome, and 3300 to 3600 in the edge wells on the west end. It is worthy of especial note that on the east end this zone, 3800 to 4060 feet below sea level, is giving a strong flow of oil with lively gas pressure from this depth. On the east end a well was carried to 4169 feet below sea level and abandoned as a dry hole.

Water Conditions.

This pool is at the present time comparatively free from water. A total of 17,500 bbls. per month is raised. Of this, 12,000 bbls. comes from 4 edge wells. One edge well which has been plugged in the bottom from 3800 to 3690 feet makes 250 bbls. of water per month, which suggests a similar treatment might improve the 4 wells above mentioned. Two inside wells make in the neighborhood of 1000 bbls. of water a month.

In part of the fields there is a sand carrying 18 gravity oil which has been cased off. There are also lenses of gas sand which are erratic in their distribution both laterally and vertically. These sands cause blow-outs during drilling which are sometimes so violent that work is interrupted and the wells are allowed to blow off for a time. Initial productions from these sands are from 1,000,000 to 50,000,000 cubic feet of gas per day. The largest of these blow-outs occurred at a depth of 2800 feet. The casing collapsed and it was not known whether the sand was drowned out by water, or exhausted itself. The well was subsequently redrilled and came in with a production of 3800 bbls. of 31 gravity oil at a depth of 3765 feet. These gas blow-outs are liable to occur at any point from this depth of 2800 feet down to the producing oil sand. The oil sands themselves produce large quantities of gas with oil often amounting to several million feet.

Under the present system of handling, no adequate protection is given to these sands overlying the oil zone. The usual practice is to cement the 10-inch where it is landed, but the principal shutoff is with the 8¼-inch just above the oil sand. If this string is carried too far, the hole is bridged with gravel, and cement lowered in torpedo cans; the 8¼ is then cemented above the bridge. It is stated that a successful job can be obtained in no other way, owing to the presence of water in the formation immediately above the producing measures. It is the belief of the men in the field that water was carried into this formation by earlier drilling.

Mr. H .R. Johnson, and others who have done geological work in this region, placed the producing zone in the upper sandy portion of the Monterey formation. Others seem inclined to place it at the base of the Fernando. The writer has made no investigations on which to base an opinion.

BREA CAÑON.

The Brea Cañon Field is located in the Puente hills where Brea Cañon opens out into La Habra Valley. It comprises about 200 acres of proven territory with 79 producing and 7 abandoned wells, ranging in depth from 2000 to 2500 feet. Production amounts to about 170,000 bbls. per month.

Geology.

The field is located in a highly disturbed region on the south side of the Puente fault. The strike of the fault is nearly east and west. The beds on the north side belong to the Puente series, while those on the south are Fernando. In the latter formation, many beds of heavy conglomerate are conspicuous in the cañon walls. Dips run from 30 to 80 degrees. There is much diversity of strike, indicating a flexure almost at right angles to the major structure.

Owing to the fact that only about half of the well logs have been filed, and most of these but recently, no detailed investigation has been made of the underground structure. A hasty examination indicates that conditions are complicated. There appears to be a marked difference in conditions reported by the wells on the north from those on the south side.

Operating Conditions.

The field is remarkable for the slow decline of its wells, notwithstanding the fact that they are considerably crowded in parts of the field. Drilling has been unusually difficult and expensive. Many of the wells have been from two to four years in drilling. The presence of heavy conglomerate makes the territory unsuitable for rotary drilling and much of the interbedded formation gives much trouble from "freezing up" and also collapsing of casing. These difficulties have resulted in the use of heavier and heavier equipment, until at the present time it is equaled on this score nowhere else in the United States.

The Birch Oil Company has successfully landed a string of 20-inch, 110-pound screw casing at a depth of 1365 feet in one of their wells.

Mr. Allen Craig, superintendent of the Fullerton Oil Company, has designed and used for four years, a special drilling rig. The drilling and casing lines are handled by a two-drum cast iron hoist, weighing about 6 tons. This hoist replaces the "bull wheels" and "calf wheel" of the usual California type of Standard rig. It is placed under the walking beam in the position usually occupied by the "calf wheel" and driven by a sprocket chain from a clutch on the band wheel shaft. The casing line drum is equipped with two speeds. A very heavy string of tools has also been designed and used by the same man. This consists of a 6-inch stem 41 feet long with 6-7-10 tool joints, with bit and jaws to match. The whole weighs about 8000 pounds. Owing to the heavy duty and the long period of heavy drilling, not only the derrick corners but also the mud sills are set on concrete piers.

Water Conditions.

The wells on the north side of the field encounter only very small quantities or no water at all; while the wells on the south side have reported both top and bottom waters. The field is making about 44,000 bbls. of water per month at the present time, most of which is coming from 11 wells. Most of the operators believe that this is return drilling water. This is undoubtedly the case as regards the northern wells. Unusually large quantities of water are continually run into drilling wells in order to keep the casing free. The nearest producing wells are observed to make from 2000 to 6000 bbls. of water per month while this drilling is going on. In some cases, when a new well comes in it will pump 200 bbls. of water per day and little or no oil; as pumping continues, the water will decrease and the oil increase until after 60 to 90 days, a well will make clean oil.

It is doubtful whether the water produced from the southern wells can be attributed to drilling water. If these wells prove to be producing from the same sands as the northern group, it would not be surprising if large quantities of the water put in at the upper end should gravitate to this end of the field. On the other hand, some of these wells have reported both top and bottom water in their logs.

SUMMERLAND FIELD.

This field is located on the Santa Barbara Channel about five miles east of the city of Santa Barbara. The record shows 364 completed wells. In June, 1916, there were 112 producing, with total production of 4600 bbls. per month, with a considerable quantity of water. The majority of wells were from 80 to 400 feet in depth and were located very close together. The total production of the pool has been about 2,000,000 barrels. For detailed information, the reader is referred to United States Geological Survey, Bulletin 321, by Ralph Arnold, and to California State Mining Bureau, Bulletin No. 69.

The field is of interest because of the fact that a large number of the wells have been drilled from piers extending out into the channel. This, however, is not such a difficult feat as might be supposed. The piers are light inexpensive affairs, owing to the fact that the channel waters are very quiet, there being almost no surf. The ocean water was excluded from the wells by driving casing into the clay beds overlying the oil sands. However, it is surprising that flooding has not been more rapid and complete than it has. Wells wrecked by a storm a number of years ago, were never repaired. In 1912 broken casing could be seen under the water with small quantities of oil and gas continually escaping. The field is also of note in that operations are continued, notwithstanding the very low production per well, which only amounts to 1.03 bbls. per day. This is due partly to the fact that there is a local market for the product and also the fact that operating costs are very low. The wells are shallow and very close together and a large number can be operated from one power.

SALT LAKE OR SHERMAN FIELD.

General Statement.

The Salt Lake Field lies about midway between the business section of the city of Los Angeles and Santa Monica. The producing territory covers about two square miles. The total completions number 434 wells. In June, 1916, there were 280 producing, 143 abandoned, and one drilling. The production amounts to about 118,000 barrels in a month.

Geology.

A general statement of the geology of the region can be found in Bulletin 309, United States Geological Survey, and Bulletins Nos. 63 and 69, California State Mining Bureau.

No statement seems to have been published giving the structural conditions in detail. A glance at a map of the field shows the present producing wells in the main field to occupy an area about half a mile in width and about two miles and a half in length, with a detached group covering about a quarter section, one mile and a half further west. The detached group is known as the Beverly Hills Field, located in the low range of hills which lines up with the Domingues and Inglewood hills. The writer has done no detail work on the underground conditions of this group.

The main field lies on the Santa Monica Coastal plain, with the long axis parallel to the Santa Monica Mountains. The whole area is covered with Pleistocene gravels and clays and also alluvial deposits, so that no idea of the structural conditions is obtainable except from a study of well logs. A little south of the center of the field there is a considerable area where these superficial deposits are heavily impregnated with asphalt, with also numerous live seepages of heavy oil accompanied by gas. It is these Brea beds which have contributed such enormous quantities of fossil remains of Pleistocene vertebrates.

From the study of well logs of the producing field, the structure is found to be a submerged anticline plunging sharply west. The producing zone is from 300 to 600 feet in thickness and some wells reported it as almost all oil sand. In the extreme northwest end of the field, near the center of Section 15, T. 1 S., R. 14 W., S. B. B. and M., the top of this zone is 100 feet below sea level. From this point there is a plunging anticline extending southwest to the vicinity of Salt Lake Oil Company's No. 5, near the center of Section 21, where there is a tendency to doming; thence the axis takes a direction N. 70° W. to Arcturus Oil Company's No. 57 in Section 20. At this point the top of the oil zone is 2900 feet below sea level, and just beyond the oil zone it is raised about 1300 feet by a fault. The hade of this fault strikes approximately S. 50° W. In the first cross section examined, it appeared to be overthrust so that a single well passed through both the truncated ends of the oil zone, but further study inclined one to the belief that the hade is nearly vertical and that wells which appeared to penetrate both the shallow and the deep oil zone, were merely located in the fractured zone of the fault where the whole formation, clear to the Pleistocene gravels, is more or less regularly impregnated with oil. It is noteworthy that some of these wells also report water from about 1200 to 1800 feet.

West of the fault zone there is a somewhat similar irregular anticline, with the axis about N. 50° W. and plunging in this direction. The top of the producing zone drops from 1600 feet below sea level to 2300 feet below sea level. At the present time the best producing wells in the field are the group of Arcturus wells on the southeast side of the fault plane. This, however, may be chiefly due to the fact that these wells are located further apart than was the practice in the shallower part of the field where the territory appears to be over drilled. The west end of the field showed some very large initial productions and some very heavy gas pressures. It is very surprising that it is doing so little today.

Water Conditions.

The prevailing opinion among operators seems to be that it is not advisable to try to remedy water conditions in an old field where water is produced from all or from the great majority of wells and it is difficult to obtain sufficient detailed information to analyze the situation and see whether this is the case or not. In the Salt Lake Field, a study has been made of the monthly production records, of 167 wells in the main part of the field. These reports are furnished by three companies in the exact manner prescribed by this department, and from them the following facts are obtained: 149 wells which are making less than 1000 bbls. of water per month each, pump 53,000 bbls. of oil (356 each); and 17,400 bbls. of water (117 bbls. each); 18 wells which are making more than 1000 bbls. of water per month each, pump 5700 bbls. of oil (319 each), and 28,000 bbls. of water (1560 bbls. each).

There is no particular reason to assume that a well making 1000 bbls. of water per month is a menace, while a well making less than that amount is all right. Each well must be considered on its merits, and local conditions taken into account. It often happens that when water increases in a well beyond a certain point, that the oil production will make a sudden decline, and conditions of this kind should be considered, rather than some arbitrary amount of water. The above analysis, however, shows that the water trouble is far more local than might be generally supposed, and it looks like good business to thoroughly investigate each of the 18 wells. In all probability some mechanical difficulty, which can be remedied, will be found in many cases. It is a well established fact that where there is an excessive quantity of water in a particular well, there is apt to be a spreading of water into an adjoining territory.

Taking a group of 40 wells out of the above 167, 38 show an average of 50 bbls. of water per month each, while two show an average of 1860. These two are 500 feet apart and are near the center of the group. The nearest well to them shows 360 bbls. of water per month. It would certainly be good business to investigate these two wells.

WHITTIER FIELD.

Whittier Field is located a short distance north and east of the town of Whittier. It lies along the foot and well up on the shoulders of the Puente hills. In many places the ground is so rough as to entail considerable difficulty in operations. In such places, most of the movement of tools and machinery is done by means of sleds. The field is two miles long by half a mile wide. There are 320 acres of proven land with 251 completed wells, 88 abandoned and 149 producing. In the month of June, there were 6 drilling wells and the production amounted to 80,000 bbls. per month.

Geology.

The field is very similar in many respects to Olinda. It is located along the Puente fault. Most of the production is from 15° to 22° Baumé, and is derived from the Fernando formation. There are a few wells producing oil of 30° to 32° Baumé which is derived from the Puente formation.

The structure is, if anything, even more complex than that of Olinda. Most of the wells are located on the south side of the fault and penetrate beds of Fernando formation inclined to a high angle.

Water Conditions.

The water conditions are serious. Detailed information has been filed with this department concerning only about 20 per cent of the wells. Thirty-two wells show a production of 61,000 bbls. of oil per month and 52,000 bbls. of water. The water is so generally distributed that there is but one well producing clean oil and one with a five per cent cut. There are no others under 20 per cent.

Like Olinda, there are wells on the northeast side of the field which show no top water. The early development in this field, dates back from 1899 to 1903. At that time little attention was paid to the matter of shutting off water. Whether or not the present condition of the field can be attributed to this earlier work, can not be determined until more information has been filed and thoroughly investigated.

OLINDA FIELD.

The Olinda Field is located in the foothills on the north side of the La Habra Valley, between Soquel Cañon and Brea Cañon. It is now practically continuous with the Brea Cañon Field.

There are 1100 acres of proven land with 395 completed wells of which 241 are producing and 100 are abandoned. In the month of June, 1916, there were 12 drilling wells, and production amounted to 220,000 bbls. per month.

Geology.

The field is located on the Puente fault. Most of the production is 15° to 22° Baumé and is obtained from the Fernando formation. The production which comes from a narrow strip on the east end of the field is 28° to 32° Baumé and is derived from the Lower Puente shale.

The structure is complex. There is one anticline, the Fernando; another in the Puente formation on the north side of the contact. There is much evidence of faulting along the contact, and both the surface exposures and underground structure, determined from well logs show the presence of secondary folding.

Water Conditions.

The wells on the north side of the field report little or no upper water in the formation. Many of these wells were drilled with machine perforated casing almost to the top of the hole. There are, however, heavy water strata overlying the oil sand on the south side of the field next to the La Habra Valley. One or two wells in the southwest of section 8, show the top oil sand to be flooded with water and have to land their water strings below this, in order to protect the lower sand.

Owing to the fact that one group of wells has reported only in per cent of the water determined by centrifugal test, the total water pumped from the field could not be estimated. One hundred and seventy wells make 30,000 bbls. per month; of this, 17,500 comes from 11 wells.

VENTURA-NEWHALL DISTRICT.

The Ventura-Newhall District has 1000 completed wells, 476 abandoned and 436 producing. The district comprises a number of fields scattered through the southern part of Ventura County and the northern part of Los Angeles County. Most of the region is rough and some of the development is far back in the mountains in places difficult of access.

The oldest oil development in the state is in this region. Seepage oil is said to have been collected and distilled as early as 1854. In the sixties, oil was produced by means of tunnels and spring-pole holes. The first successful drilling with steam rigs was done in 1877 in Pico Cañon. It is interesting to note that this property is still producing.

Geology.

For detailed information regarding the geology of the region, the reader is referred to United States Geological Survey, Bulletin No. 309. A brief statement of the geology is necessary in order to understand the operating conditions in the district. The producing sands are not confined to any one geologic horizon, but are found in beds of all ages from upper Topa Topa through to the Fernando.

The structure is very complex. The main structural features run in a general east and west direction. The dominant feature of the region is the Topa Topa anticline which involves the Topa Topa formation through the Santa Ynez range from Point Conception to Sespe Creek. This structure is roughly paralleled along the south by secondary faulting and folding. At Sespe Creek, the main structure plunges to the eastward and is replaced by a number of intricate folds involving successively the Sespe, Vaqueros, Modelo and Fernando formations. This type of structure extends east as far as San Franciscito Cañon.

The development north of the Santa Clara River has taken place around the plunging end of the main anticline, and along the secondary structures above referred to. A sharp fold extending from Pitas Point to Sexton Cañon, has recently come into prominence by the discovery of oil of 54° Baumé in a well drilled near the Ventura River.

South of the Santa Clara River there are a number of sharp folds having a general east and west trend, extending along Oak Ridge and Santa Susana mountains. A well defined anticline extends along the foothills on the north side of South Mountain and Oak Ridge from the vicinity of Santa Paula east as far as Wiley Cañon. The axis is not only tortuous, but has a number of ups and downs. The beds exposed along it range in age from Middle Sespe to Fernando. The most productive pools in the district are situated along this structure and are located at the points where the axis rises to form domes.

From Wiley Cañon to Salt Cañon there are a number of irregular folds, instead of a single well developed anticline. The region is one of extreme complexity, characterized by faulting and overturning to such an extent that the details of the structure have never been satisfactorily worked out.

From Salt Cañon the Pico anticline extends into the region of Fernando Pass. In Pico Cañon the fold is slightly overturned to the south and in Wiley Cañon it is overturned to the north. The Pico field is situated on the plunging end of this structure.

A secondary fold trending a little south of west extends from the vicinity of Santa Susana Pass, through the Simi Valley to a point near Somis. It involves the Topa Topa, Sespe and the Fernando formations. A small group of wells located on the east end of this structure is producing 35° Baumé.

Water Conditions.

The average production for the district is about 7 bbls. of oil per day. However, much of the oil is high gravity and high gasoline content. This fact, coupled with cheap drilling and operating conditions, has enabled operations to be carried on in the district at a profit. So few of the operators have filed complete water data that but little can be said of conditions of the district, as a whole. Some of the fields are known to be relatively free from water, notwithstanding the age of the wells. In several of the smaller pools, the water condition is very bad.

General Conclusions.

An arbitrary amount of water produced per well per month has been used as a dividing line in order to show that water conditions, even in some of the older fields, are far more local than might generally be supposed. There is no intention, however, to set such a limit and say that all wells making over this amount are a menace and all wells under it are regarded as all right. There are a number of things to be taken into consideration, one of the most important is the position at which the working barrel is placed. Under certain conditions a working barrel could be located high so as to skim the oil, while if it were placed lower down there might be more water than the pump would handle. A 2″ by 6″ working barrel run at 20 r. p. m. giving 70 per cent efficiency will handle 220 barrels per day. A 3″ by 6″, under the same conditions will handle 520. It is natural to suppose that in any case where a pump is working to capacity that there is apt to be water in the surrounding wells as well. In any investigation of a well the condition of all the neighboring wells should be carefully investigated.

If a group of wells are all making water, the use of dyes to determine the origin of the water is recommended. Green or blue is more easily detected than red, though I notice that red dyes are highly recommended in the scanty literature to be found on the subject. The fact that emulsified oil is reddish in color makes red in a diluted state very difficult to recognize. Owing to the present scarcity of dyes, due to the European wars, dyes are very expensive and many are difficult to obtain at any price. However, a crude dye would answer the purpose and such dyes should not prove very expensive as the greatest expense is entailed in refining. Very good results are said to have been obtained in the matter of tracing water by the use of dyes on the Santa Fe properties in Midway. The use of a substitute which might get the same result as dye, has been suggested. A rare and at the same time an easily recognizable element, such as lithium, might be used. The water should be first tested for lithium and if it was not found, a salt of lithium could be introduced in the well suspected of giving trouble, then samples taken from neighboring wells and a test made for the presence of lithium.

It is, for some reason, difficult to get operators to undertake such investigation; they generally balk at the expense, and yet the expense of such investigation as compared with expenditures in working with a crew of workmen at the ordinary operations about a well, would be very small. If results were obtained at all they would be very positive, and then the work of remedying could be undertaken in an intelligent manner. A crew costing $25 per day will often be employed for days, even weeks, around a troublesome well engaged in operations which are purely experimental, and yet the same operator will not spend $50 or $100 in experimenting with dye.

The location of a well with respect to the geologic structure is also important in this connection, and due consideration should be given to this phase. For instance, an edge well might be making large quantities of water without, in any way, being a menace to the wells up the dip from it. It must be recognized that in an investigation of a well, or group of wells, local conditions must control, and each must be carefully investigated in regard to such local condition.

DECISIONS.

Official Decisions Were Made on the Following Wells.

(The figures CC–82, etc., refer to report number.)

SECTION 19, 1–14.
CC–82. Abandon, West Coast Oil Company well No. 25, Picot.

SECTION 20, 1–14.
CC–95. Begin drilling, James F. Ross well No. 2.

SECTION 21, 1–14.
CC–101. Abandon, Salt Lake Oil Company well No. 3.
CC–100. Abandon, Salt Lake Oil Company well No. 2.
CC–99. Abandon, Salt Lake Oil Company well No. 1.
CC–78. Abandon, Salt Lake Oil Company well No. 219.
CC–59. Begin drilling, James F. Ross well No. A.

SECTION 26, 1–15.
CC–81. Abandon, West Coast Oil Company well No. —, Gillis.
CC–80. Abandon, West Coast Oil Company well No. 23, Wolfskill.
CC–79. Abandon, West Coast Oil Company well No. 43, Wolfskill.

SECTION 16, 2–9.
CC–55. Begin drilling, Gold Seal Petroleum Company well No. 1.

SECTION 20, 2–9.
CC–54. Begin drilling, Copa de Oro Petroleum Company well No. 1.

SECTION 2, 2–10.
Letter, dated October 4, 1915.
Begin drilling, Columbia Oil Producing Company wells Nos. 7 and 25.

SECTION 22, 2–11.
CC–67. Deepen, Central Oil Company well No. 46–A.
CC–14. Deepen, Central Oil Company well No. 44–B.
CC–11. Redrill, Canadian Pacific Oil Company well No. 12.
CC–6. Deepen, Central Oil Company well No. 2–C.
Letter, Home Oil Company well 19, December 4, 1915.
CC–114. Deepen, Central Oil Company well No. 30–B.

SECTION 23, 2–11.
CC–7. Drill new well, Central Oil Company well No. 32–C.

SECTION 26, 2–11.
CC–104. Drill, Standard Oil Company well M–W No. 45.
CC–103. Drill, Standard Oil Company well M–W No. 44.
C–45. Water shutoff, Standard Oil Company well No. 38.

SECTION 26, 2–11—Continued.

C–26. Shutoff, Standard Oil Company well No. 36.

C–25. Shutoff, Standard Oil Company well No. 37.

CC–28. Begin drilling, Standard Oil Company well No. 39.

CC–23. Begin drilling, Standard Oil Company well No. 38.

C–12. Shutoff, Standard Oil Company well No. 35. Report dated September 13, 1915. Standard Oil Company, shutoff well No. 32. (Test made by M. J. Kirwan.)

Letters, August 19, 1915. Begin drilling. Standard Oil Company wells Nos. 32 and 35.

CC–111. Begin drilling, Standard Oil Company well No. 43.

SECTION 8, 3–6.

CC–13. Begin drilling, Towsley Cañon Oil Company well No. 1.

SECTION 8, 3–9.

C–39. Shutoff, Union Oil Company well No. 5.

CC–68. Begin drilling, Petroleum Development Company well No. 74.

C–49. Water shutoff, Columbia Oil Producing Company well No. 27.

CC–85. Abandon, West Coast Oil Company well No. 10.

CC–84. Abandon, West Coast Oil Company well No. 7.

C–43. Shutoff, Columbia Oil Producing Company well No. 26.

CC–83. Abandon, West Coast Oil Company well No. 19, Olinda.

CC–86. Deepen, Petroleum Development Company well No. 26.

CC–49. Abandon, Olinda Land Company well No. 16.

CC–46. Abandon, Olinda Land Company well No. 3.

CC–53. Begin drilling, Columbia Oil Producing Company well No. 27.

CC–43. Deepen, Petroleum Development Company well No. 41.

CC–39. Deepen, Petroleum Development Company well No. 24.

CC–38. Begin drilling, Olinda Land Company well No. 17.

CC–18. Begin drilling, West Coast Oil Company well No. 65.

CC–4. Drilling, West Coast Oil Company well No. 70.

Letter, September 18, 1915. Amalgamated Oil Company, drilling wells 58, 59 and 80.

C–57. Shutoff, West Coast Oil Company well No. 70.

C–58. Shutoff, West Coast well No. 65.

CC–113. Drilling, Petroleum Development Company well No. 75.

SECTION 13, 3–9.

C–29. Shutoff, Amalgamated Oil Company well No. 28.

SECTION 16, 3–9.

CC–69. Begin drilling, Olinda Land Company well No. 18.

CC–47. Abandon, Olinda Land Company well No. 12.

SECTION 17, 3–9.

CC–107. Redrill, Quintuple Oil Company well No. 2.

CC–48. Abandon, Olinda Land Company well No. 15.

CC–45. Begin drilling, Union Oil Company well No. 2.

CC–36. Abandon, Union Oil Company well No. 50. This should be classed as a redrilling job, as derrick was moved on account of crooked hole.

No. 6 water shutoff, Quintuple Oil Company well No. 2.

No. 6, Quintuple No. 2. 10″ landed 2561 8¼ landed 2600 both instances well made water when drilled ahead. Well was drilled to 2990 but made 90 bbls. water and 10 of oil.

CC–107. Quintuple No. 2. Hole was filled cement at 2702, 8¼ was cut at 2502 and redrilled to 2732 where it was cemented and the well tested O.K.

Judging from the logs of S. O. Ci. No. 1 (Coyote–3), 2–3–9 and Quintuple No. 1, it was by belief that a water existed about 2700 and that the 10″ and 8¼ were both landed too high.

CC–45. Union 2 (broken stock) notwithstanding the trouble above recorded in offset well, Quintuple No. 2, Union notice states, expect to shutoff at 2500.

C–3. Shutoff, Quintuple Oil Company well No. 2.

SECTION 18, 3–9.
No. 4, water shutoff, St. Helens Petroleum Company Johnson well No. 3.
C–21. Water shutoff, Union Oil Company well No. 37.
CC–29. Abandon, Standard Oil Company well No. 5.
CC–42. Redrill, Union Oil Company well No. 38.
CC–50. Abandon, Standard Oil Company well No. 8.
C–55. Shutoff, Union Oil Company well No. 36, G. and L.

SECTION 19, 3–9.
C–22. Geo. C. Fetterman well No. 3.
CC–22. Application to deepen Geo. C. Fetterman well No. 3 was not approved because deeper drilling in this part of the field had showed underlying sands to contain large amounts of water.
C–37. Shutoff, San Diego Consolidated Oil Company well No. 4.
C–50. Shutoff, Fullerton Great West Oil Company well No. 3.

SECTION 20, 3-9.
Report dated August 29th, Standard Oil Company, shutoff, well No. 1. Signed by M. J. Kirwan.
C–22. Shutoff, Standard Oil Company well No. 1.
CC–27. Begin drilling, Standard Oil Company well No. 2.

SECTION 2, 3–10.
CC–12. Begin drilling, Fullerton Oil Company well No. 11.
C–30. Shutoff, Birch Oil Company well No. 11.
C–31. Shutoff, Fullerton Oil Company well No. 11.
C–33. Shutoff, Birch Oil Company well No. 13.
CC–35. Abandon, Union Oil Company well No. 3. (See your letter February 3, 1916.)
CC–58. Redrill, Brea Cañon Oil Company well 3–A.
CC–73. Deepen, Brea Cañon Oil Company well No. 22.

SECTION 13, 3–10.
Letter, September 25, 1915. Amalgamated, Shutoff well No. 28. (Signed M. J. Kirwan.)
No. 2. Amalgamated Oil Company, shutoff, well No. 1.
No. 5. Amalgamated Oil Company, shutoff, Anaheim well No. 12.
CC–1. Amalgamated Oil Company, redrill, well No. 2.
C–23. Shutoff, Amalgamated Oil Company well No. 2.
C–48. Shutoff, Amalgamated Oil Company well No. 2.
CC–52. Redrill, Amalgamated Oil Company well No. 6.

SECTION 15, 3–10.
C–15. Shutoff, Union Oil Company well No. 3.

SECTION 17, 3–10.
C–34. Shutoff, Standard Oil Company well No. 19.
CC–62. Begin drilling, Standard Oil Company well No. 23.

SECTION 18, 3–10.
Letter, redrilling, Standard Oil Company well No. 16.
Letter, October 7, 1915. Begin drilling, Standard wells Nos. 20 and 21.
C–2. Shutoff, Standard Oil Company well No. 18.
C–4. Shutoff, Standard Oil Company well No. 11.
CC–9. Begin drilling, Standard Oil Company well No. 22.
C–17. Shutoff, Standard Oil Company well No. 16.
C–41. Shutoff, Standard Oil Company well No. 20.

SECTION 18, 3–10—Continued.
C–44. Water shutoff, Standard Oil Company well No. 22.
CC–63. Begin drilling, Standard Oil Company well No. 24.
CC–64. Begin drilling, Standard Oil Company well No. 25.

SECTION 21, 3–10.
CC–44. Begin drilling, Union Oil Company well No. 5.

SECTION 22, 3–10.
Letter September 10, 1915. Shutoff, Standard Oil Company wells Nos. 6 and 5.
Report dated September 14, 1915. Standard Oil Company, shutoff, well No. 6. (Signed by M. J. Kirwan.)
Letter, October 4, 1915. Drilling, Standard Oil Company well No. 7.
C–5. Shutoff, Union Oil Company well No. 1.
C–7. Shutoff, Union Oil Company well No. 1.
C–14. Shutoff, Amalgamated Oil Company well No. 16.
C–24. Shutoff, Standard Oil Company well No. 7.
CC–106. Drill, Standard Oil Company well No. 8, Coyote lease No. 2.

SECTION 23, 3–10.
C–9. Shutoff, Amalgamated well No. 40.
C–11. Shutoff, Amalgamated well No. 14.
C–13. Shutoff, Union well No. 6.
CC–16. Begin drilling, Amalgamated well No. 17.
CC–17. Begin drilling, Amalgamated well No. 20.
CC–24. Begin drilling, Union well No. 8.
CC–25. Begin drilling, Union well No. 9.
C–32. Shutoff, Amalgamated well No. 20.
C–36. Shutoff, Amalgamated well No. 17.
CC–40. Begin drilling, Amalgamated well No. 15.
C–40. Shutoff, Amalgamated well No. 15.
C–54. Water shutoff, Union Oil Company well No. 7.
CC–56. Begin drilling, Union well No. 11.
CC–57. Begin drilling, Union well No. 12.
CC–60. Begin drilling, Amalgamated well No. 10.
CC–65. Redrill, Amalgamated well No. 10.
CC–70. Begin drilling, Union Oil Company well No. 13.
CC–72. Begin drilling, Amalgamated well No. 23.
CC–96. Drill, Amalgamated Oil Company well No. 8 Haulde.

SECTION 24, 3–10.
CC–71. Abandon, Amalgamated well No. 22.
CC–97. Drill, Amalgamated well No. 40, Anaheim.
CC–98. Abandon, Petroleum Company well No. 1.

SECTION 13, 3–11.
Letter, shutoff, Standard well No. 19. (M. J. Kirwan.)
Report dated August 17, 1915. Shutoff, Standard well No. 19. (M. J. Kirwan.)
Letter, September 22, 1915. Redrilling, Standard well No. 6.
CC–8. Begin drilling, Standard well No. 25.
CC–20. Deepen, Standard well No. 3.
C–27. Shutoff, Standard well No. 22.
C–42. Shutoff, Standard well No. 23.
C–51. Shutoff, Standard well No. 20.
C–53. Shutoff, Standard well No. 25.

SECTION 18, 3–11.
C–18. Shutoff, Standard Oil Company well No. 21.

SECTION 24, 3–11.
Letter, October 7, 1915. Drilling, Standard well No. 24.
C–6. Shutoff, Standard well No. 21.
C–16. Shutoff, Standard well No. 24.

SECTION 24, 3–11—Continued.
- C–38. Shutoff, Standard well No. 24.
- CC–51. Begin drilling, Standard well No. 26.
- CC–108. Abandon, Standard well No. 4, McNally.
- CC–109. Drill, Standard well No. 5, McNally.

SECTION 13, 3–16.
- CC–105. Drill, Standard well No. 26.

SECTION 2, 3–17.
- CC–102. Standard well No. 41.

SECTION 8, 3–17.
- CC–94. Abandon, Union well No. 1.

SECTION 36, 3–18.
- Letter, February 29, 1916. Deepen, Petroleum Company well No. 7.
- Letter, May 10, 1916. Deepen, Petroleum Company well No. 1.

SECTION 1, 3–19.
- CC–66. Abandon, Oak Ridge Oil Company well No. 1. (See also letters.)

SECTION 3, 3–19.
- CC–3. Deepen, Calumet Oil Company well No. 4.
- CC–37. Begin drilling, Calumet Oil Company well No. 7.

SECTION 4, 3–19.
- Letter, November 30, 1915. Plugging, Montebello well No. 88.
- CC–2. Deepen, Montebello well No. 38.
- C–10. Shutoff, Montebello well No. 97.
- C–19. Shutoff, Montebello well No. 97.
- C–35. Shutoff, Montebello well No. 82.
- CC–41. Deepen, Montebello well No. 25.
- C–46. Shutoff, Montebello well No. 82.
- C–52. Shutoff, Montebello well No. 89.
- CC–88. Begin drilling, Montebello well No. 109.
- CC–89. Begin drilling, Montebello well No. 89.
- CC–90. Begin drilling, Montebello well No. 98.
- CC–91. Begin drilling, Montebello well No. 85.
- CC–112. Drilling, Montebello Oil Company well No. 81.

SECTION 12, 3–20.
- CC–92. Redrill, West Huasna Oil Company well No. 1.

SECTION 18, 3–20.
- CC–110. Drill, Santa Paula Oil Association well No. 1.

SECTION 12, 4–18.
- CC–93. Abandon, Ramona Home Oil Company well No. 1.

SECTION 20, 4–19.
- C–28. Shutoff, Ventura Oil Lands Company well No. 1.

SECTION 13, 4–25.
- CC–19. Deepen, California Reliance Oil Company well No. —.

SECTION 33, 5–19.
- CC–5. Drilling, White Star Oil Company well No. 15.

SECTION Miscellaneous.
- CC–61. Abandon, Zenith Oil Company well No. 4.
- Rancho San Franciscito, Newhall Field.
- Torrey Oil Field, Ventura County.
- C–20. Shutoff, Eureka Cañon Syndicate well No. —.
- CC–26. Deepen, Cameron Oil Company well No. 2. Rancho San Franciscito.

Salt Lake Field.
- Letters re Amalgamated Arcturus well No. 21, redrilling.
- CC–10. Deepen, La Brea Oil Company well No. 20. Lot 6, Rancho La Brea.
- CC–74. Abandon, West Coast Oil Company well No. 19. Rancho de las Aguas,

Rancho La Brea, Salt Lake Field.

CC–30. Deepen, Rancho La Brea Oil Company well No. 4.
CC–31. Abandon, Arcturus Oil Company well No. 86.
CC–32. Abandon, Arcturus Oil Company well No. 84.
CC–33. Abandon, Arcturus Oil Company well No. 65.
CC–75. Abandon, Arcturus Oil Company well No. 131.
CC–76. Abandon, Arcturus Oil Company well No. 116.
CC–77. Abandon, Arcturus Oil Company well No. 108.

Rancho San Jose de Buenos Ayers.

CC–21. Abandon, West Coast well No. 50.

Rancho San Pedro, Los Angeles County.

CC–15. Begin drilling, Highland Development Company well No. 1.
CC–87. Redrill, Highland Development Company well No. 1.

SECTION 6, 2–18.

BB–1. Abandonment, Hidalgo Oil Company well No. 1. Considerable correspondence redrilling this well, which was later abandoned.

The fact that the Mining Bureau directed the abandonment of this well prevented a lawsuit between the landowner and leasor. It was claimed that the well had injured a nearby artesian water basin. The proper plugging of the well settled the controversy.

SECTION 36, 3–18.

The following decisions in my district were made by other officials of the Bureau:

Letter, May 10, 1916. Deepen, Petroleum Company well No. 1.
Letter, February 29, 1916. Deepen, Petroleum Company well No. 7.
D–1. Shutoff, Petroleum Company well No. 14.

RECORDS RECEIVED.

Logs and production reports have been received as shown in the following list, which clearly shows the extent to which various operators have complied with the law and taken steps to receive the assistance that can be furnished by this department. It will be noted that a number of operators are furnishing production reports which are incomplete and of but slight value. A number of concerns have filed almost no logs.

SALT LAKE.

Company	Number of completed wells	Number of logs filed	Number of logs not yet filed	Water report	
				Yes	No
Amalgamated Oil	73	73	----------	Yes	--------
West Coast Oil	26	26	----------	Yes	--------
Salt Lake Oil	115	115	----------	Yes	--------
Rancho La Brea Oil	68	6	62	--------	No
Pacific Light and Power	45	----------	45	Yes	--------
Gilmore Oil Company	22	----------	22	--------	No
WHITTIER.					
Central Oil	85	2	83	--------	No
Standard Oil	80	27	53	Yes	--------
Whittier Crude	12	----------	12	--------	No
Home Oil	18	----------	18	--------	No
Colorado Oil	11	----------	11	--------	No

BREA CAÑON.

Company	Number of completed wells	Number of logs filed	Number of logs not yet filed	Water report	
				Yes	No
Brea Cañon Oil	24		24		No
General Petroleum	10	10		Yes	
Birch Oil	9	4	5	Yes	
Fullerton Oil	9	9		Yes	
Union Oil	14		14	Yes	
OLINDA FIELD.					
Union Oil	30		30	Yes	
Columbia Oil Producing	54		54	Yes	
Petroleum Development	71	24	47	Yes	
General Petroleum	34	34		Yes	
Olinda Land	17	17		Yes	
West Coast	61	61		Yes	
Fullerton Oil	12		12	Yes	
EAST COYOTE.					
Union Oil	28	15	13	Yes	
Amalgamated	30	30		Yes	
Standard Oil	16	16		Yes	
The Petroleum Company	6	6		Yes	
Quintuple Oil	3	3		Yes	
St. Helens Petroleum	12	12		Yes	
Fullerton Great West	3	3		Yes	
San Diego Cons. Oil	3		3	Yes	
Calokle Oil	5	5			No
Geo. C. Fetterman	3	3			No
WEST COYOTE.					
Standard Oil	44	44		Yes	
Union Oil	4		4		
SIMI.					
Santa Susana Syndicate	7	7		Yes	
Hidalgo	3	1	2		No
Petrol	12	12		Yes	
NEWHALL.					
Standard Oil Company	84	6	78		No
Zenith Oil Company	3	1	2		No
PIRU.					
Union Oil	59		59	Yes	
Beatty Oil and Development	1		1	(inc.)	
Ramona Home Oil	1	1		(aban.)	
Cameron Oil					
South Pacific	22		22		No
Modelo	20		20		No
Sunset Oil	11		11		No
Aloha	12		12		No

BARDSDALE.

Company	Number of completed wells	Number of logs filed	Number of logs not yet filed	Water report	
				Yes	No
Calumet Oil	7	7			No
Montebello Oil	85	85		(inc.)	
West Huasna Oil	4	1	3		No
Union Oil of California	24	24		Yes	
Mutual Oil Company	7		7		No
Bardsdale Crude	7		7		No

SOUTH MOUNTAIN.

Oak Ridge Oil	1	1		(inc.)	
Santa Paula Oil Association	1	1		Yes	

SANTA PAULA.

Santa Clara Oil and Development	1	1		Yes	
Union Oil	31		31	Yes	
Empire Oil	11		11		No
D. M. & W. Co.	22		22		No
Salt Marsh Oil	18		18		No
Shell Petroleum	11		11		No
Henderson Union	13		13		No
Thanksgiving Oil	6		6	(aban.)	
Elim Oil	1		1		

SESPE.

White Star Oil	12	12		(inc.)	
Union Oil	30		30	Yes	
Turner Oil	5		5		No
Rose Oil	3		3		No
Ventura California	2		2		No
Sespe Consolidated	7		7		No

OJAI.

State Consolidated Oil	1		1		
Bard Oil and Asphalt	38		38		No
Capitol Crude	16		16		No
Pyramid Oil	15		15		No
Santa Maria Crude	1		1		No
Ojai Oil	4		4		No

CHAPTER V.

REPORT COVERING THE OIL FIELDS OF THE SANTA MARIA DISTRICT.

By R. E. Collom, Deputy Supervisor.

List of Formal Complaints, Etc.

There have been no formal complaints registered with this office since it was opened. This does not mean that there are no causes for complaint, but very few companies here are in a position to complain because their own boundaries are wet. The general prevalence of Second Zone water in the Santa Maria Field seems to have eclipsed the possibility of water migrating from an offending well to its neighbors.

List of Records Received, Etc.

With the exception of the Pinal Dome Oil Company every producing company in the Santa Maria District has furnished this department with a complete set of logs of their respective wells. The Pinal Dome Oil Company has furnished part of their logs but there are still a number lacking. The geological department of the Union Oil Company of California submitted a complete set of blue-print graphic logs of the Union Oil Company wells in this district. These logs were found to be inadequate for our purpose and, upon request, the local field office made up a set of logs (124 logs in duplicate) sparing no time nor pains in the effort to make them as complete and accurate as possible. The smaller companies are also to be commended for their promptness in filing logs. With one or two exceptions, all of the old companies in the Santa Maria District, as well as a number of other concerns, have displayed a hearty cooperation with this department in its preliminary efforts.

The following is a list of the companies which have filed logs with this department:

Associated Oil Company.
Bradley Cañon Oil Company.
Brookshire Oil Company.
Gato Ridge Oil Company.
Gilroy Oil Company.
J. W. Goodwin.
New Pennsylvania Petroleum Company.
Pacific Oil Fields Limited.
W. P. Hammon (Bell Lease).
Palmer Union Oil Company.
Pinal Dome Oil Company (in part).
Recruit Oil Company.
Rice Ranch Oil Company.
Santa Maria Oil Fields, Incorporated.
Shaw Ranch Oil Company.
Union Oil Company of California.
Western Union Oil Company.

Production Reports.

All of the producing companies in the Santa Maria District, without exception, furnish this office with the Monthly Production Report, in duplicate. The following is a list of the companies that have submitted production reports since October, 1915:

Brookshire Oil Company.
New Pennsylvania Petroleum Company.
Orcutt Oil Company.
Palmer Union Oil Company.
Pinal Dome Oil Company.
Santa Maria Oil Fields, Incorporated.
Rice Ranch Oil Company.
Union Oil Company of California.
Western Union Oil Company.

Other Records.

Other records on file in this office which have been prepared by the deputy in charge are:

List of derrick floor elevations of wells in this district.
Working map of the Santa Maria Field—scale of 500 ft. to 1 in.
Working map of the Cat Cañon Field—scale of 500 ft. to 1 in.
Underground contour map of 2d Oil Zone of the Santa Maria Field—scale of 500 ft. to 1 in.
Eight 36-inch cross-sectional drawings showing geologic structure in the Santa Maria, Cat Cañon and Lompoc oil fields—O–scale of 500 ft. to 1 in.
112 graphic logs on tracing cloth—scale of 100 ft. to 1 in.
Four blue-print cross-sections prepared from graphic logs—scale of 100 ft. to 1 in.
One map of Arroyo Grande Field—scale of ½ mile to 1 in.

Decisions.

The following decisions have been made on proposed well operations. (The figures B–8, etc., refer to the report number.)

Section — 8–33. Los Alamos Rancho.
B–8. Shutoff, Pinal Dome Oil Company well B–8.
B–7. Shutoff, Pinal Dome Oil Company well B–2.

Section 19, 9–33.
BB–7. Deepen, New Pennsylvania Pet. Company well No. 4.

Section 22, 9–33.
B–3. Shutoff, Pinal Dome Oil Company well No. 1, Los Flores.

Section 23, 9–33.
BB–8. Redrill, Santa Maria Oil Fields of California, Ltd., well No. 6.

Section 24, 9–33.
Letter to E. B. L. September 29, 1915. Shutoff, Palmer Union Oil Company well No. 1.

Section 26, 9–33.
B–2. Shutoff, Palmer Union Oil Company well No. 7.
BB–5. Redrill, Palmer Union Oil Company well No. 7.
BB–15. Extend casing, Palmer Union Oil Company well No. 4.

Section 27, 9–33.
Form No. 113. June 30, 1916. Drill, Santa Maria Oil Fields well B–2.

Section — 9–34. Los Alamos Rancho.
BB–9. Deepen, Pinal Dome Oil Company well No. G–14.
BB–10. Deepen, Pinal Dome Oil Company well No. G–5.

Section — 8–32. Cat Cañon Field.
BB–2. Abandon, Pinal Dome Oil Company well No. T–3.

SECTION 31, 31–13.
B–17. Water shutoff, B. T. Dyer well No. 1.

SECTION 32, 9–33.
B–6. Shutoff, Western Union Oil Company well No. 57.
BB–6. Redrill, Western Union Oil Company well No. 53.

SECTION 24, 9–34.
BB–3. Deepen, Pinal Dome Oil Company well No. A-11.
B–4. Shutoff, Pinal Dome Oil Company well No. A–11.
BB–4. Partly abandon, Pinal Dome Oil Company well No. 1–E.
BB–11. Deepen, Pinal Dome Oil Company well No. P–4.
BB–16. Deepen, Pinal Dome Oil Company well No. P–23.
BB–17. Deepen, Pinal Dome Oil Company well No. A–13.

SECTION 22, 9–34.
B–13. Shutoff, Pinal Dome Oil Company well No. LF–2.

SECTION 25, 9–34.
BB–18. Deepen, Union well No. 30, Newlove.

SECTION 26, 9–34.
B–16. Shutoff, Union well No. 27.

SECTION 33, 10–33.
BB–13. Abandon Bradley Cañon Oil Company well No. 1.

SECTION 31, 11–4. Sargent Field.
Letters, redeepening well No. 6, Gilroy Oil Company.

Miscellaneous, Santa Maria Field.
Letter, September 20, 1915. Shutoff, Casmalia Syndicate well No. 3.
Letter, signed by E. B. Lathem, at Taft.
B–1. Shutoff, Rice Ranch well No. 13.
B–9. Shutoff, Western Union well No. 57.
B–10. Shutoff, Union well No. 34, Newlove.
B–11. Shutoff, Pinal Dome well No. G–5, Graciosa.
B–12. Shutoff, Pinal Dome well No. H–2, Harris.
BB–12. Deepen, Union well No. 12, Newlove.
B–14. Shutoff, Union well No. 12, Newlove.
BB–14. Deepen, Union well No. 27, Newlove.
B–15. Shutoff, Pinal Dome well No. G–14, Graciosa.

SECTION Miscellaneous, Cat Cañon.
B–5. Shutoff, Union well No. 7, Bell Lease.

SANTA MARIA DISTRICT AND ARROYO GRANDE FIELD.

Infiltration of Water.

In gathering data on the causes of the presence of water in the producing oil sands of the Santa Maria District it was found necessary to rely mostly upon the opinions of the operators. Of about 250 logs examined there are less than 50 logs that make any mention of water, and most of these give only the data on top water. There were eleven wells abandoned under the direction of this department during the past year. Three wells were redrilled and sixteen wells deepened because of water trouble.

The remedies presented are meager and by no means conclusive; but I believe that these ideas will be useful, working with dyes and packers, in getting at a great deal of the water trouble.

It is hardly necessary to state to what extent the Santa Maria District is affected by water, but in order to bring the situation out concretely, the following figures will show the condition of the Santa Maria Field during the month of June, 1916:

There are 257 wells in the Santa Maria Field. Of these 257 wells, 185 were producing during June, 1916. The total fluid production (as given in the Monthly Production Reports to this department) from these wells was 335,526 barrels. Of this fluid production 228,395 barrels were oil and 107,131 barrels were water. Ninety-four of these wells—about one-half of the wells producing—contributed 95 per cent of the water.

The Union Oil Company of California keeps production figures which show both the amounts of water in the oil, by distillation test, and the amount of water drawn off from settling tanks, credited to each well, during the month. These figures combined give a much higher water percentage for the Union production than the average of any of the other companies operating in the Santa Maria District. Judging from these figures the total water produced by all companies must have been considerably higher than the 107,131 barrels reported.

CAUSES OF WATER INFILTRATION.

Failure to shut off top water.
Failure to locate and shut off bottom water.
Corrosion and perforation of water strings by surface water.
Wells improperly abandoned.

Failure to Shut off Top Water.

Although this department has no specific knowledge at this time, of failure to shut off top water, it is the opinion of several operators that such a condition exists in some of the oldest wells drilled in this district. Tests should be made by this department to determine whether any such conditions exist.

Failure to Locate and Shut off Bottom Water.

The failure to locate and shut off bottom water is undoubtedly the most prevalent cause of water infiltration in this district. The strata that harbor bottom water probably lie in an indefinable position at the base of the 2d Oil Zone. This is discussed more fully under the subject of "Water in the 2d Oil Zone." The logical remedies seem to be:

1. To cement up from bottom, making frequent tests until the water is eliminated. To cement up through the 2d Oil Zone into the "Big Brown."

2. To cement up through the 2d Oil Zone into the "Big Brown" shales and shoot these for production.

3. To deepen wells, where conditions will permit, into the 3rd Oil Zone, sealing up the oil and water production of the 2d Oil Zone.

Corrosion and Perforation of Water Strings by Surface Water.

The subject of surface water eating through the water strings is covered in this report under the discussion of water conditions in "Group EE." Tests similar to those recommended when top water was not shut off should be applied here.

Abandoned Wells.

It would seem probable, considering the manner in which wells were abandoned in the early days, that some of the water trouble might be traced to this source. The following is a partial list of abandoned wells in the Santa Maria District:

Bradley Cañon Oil Company No. 1.
Brookshire Oil Company No. 2.
Brookshire Oil Company No. 8.
Brookshire Oil Company No. 7.
New Penn. Petroleum Company No. 3.
New Penn. Petroleum Company No. 7.
Palmer Union (Rice) No. 8.
Palmer Union (Rice 2) No. 2.
Pinal Dome (Tognazzini) No. 3.
Associated Oil Lucas No. 1.
Recruit Oil Company (Newhall) No. 1.
Recruit Oil Company (Pezzoni) No. 1.
Recruit Oil Company (Williams) No. 1.
Western Union Oil Company No. 1.
Western Union Oil Company No. 2.
Western Union Oil Company No. 8.
Western Union Oil Company No. 9.
Western Union Oil Company No. 13.
Western Union Oil Company No. 16.
Western Union Oil Company No. 17.
Western Union Oil Company No. 20.
Western Union Oil Company No. 19.
Western Union Oil Company No. 26.
A. Weil No. 1.
Coblentz Oil Company No. 1.
Coblentz Oil Company No. 2.
Merchants Oil Company No. 1.
Dispatch Oil Company No. 1.
Cat Cañon Oil Company No. 1.
Treasure Oil Company (Section 19, Cat Cañon) No. 1.
Pinal Dome Oil Company (Section 30, Cat Cañon) No. 1.
Santa Maria Pet. and P. L. Co. No. 1.
Santa Maria Enterprise No. 1.
Recruit Oil Company (Section 31, Cat Cañon) No. 1.
Carpenteria Oil Company No. 1.
Pacific Oil Fields, Ltd., No. 1.
Pacific Oil Fields, Ltd., No. 3.
Pacific Oil Fields, Ltd., No. 4.
Pacific Oil Fields, Ltd., No. 5.
Pacific Oil Fields, Ltd., No. 6.
Pacific Oil Fields, Ltd., No. 7.
Pacific Oil Fields, Ltd., No. 8.
Western Union Oil Company No. 27.
Western Union Oil Company No. 28.
Western Union Oil Company No. 31.
Western Union Oil Company No. 35.
Western Union Oil Company No. 36.
Western Union Oil Company No. 38.
Western Union Oil Company No. 39.
Western Union Oil Company No. 42.
Pinal Dome Oil Company No. G–9.
Pinal Dome Oil Company No. G–12.
Pinal Dome Oil Company No. G–13.
Pinal Dome Oil Company No. G–18.
Pinal Dome Oil Company No. G–19.
Pinal Dome Oil Company No. G–20.
Santa Barbara O. and M. Co. No. 1.
Radium Oil Company No. 1.
Radium Oil Company No. 2.
Chaffin Oil Company No. 1.
Speed Oil Company No. 1.
Laguna Oil Company No. 1.
Hall and Hall No. 2.
Santa Maria Pet. and P. L. Co. (Section 21), No. 1.
Emmet Bryant No. 1.
St. Helens Petroleum Company No. 1.

- Fugler Oil Company No. 1.
- Union Oil Company of California—
  - Squires No. 1.
  - Hartnell No. 2.
  - Hartnell No. 3.
  - Fox No. 7.
  - Hobbs No. 3.
  - Hobbs No. 10.
  - Bell No. 3.
  - Bell No. 4.
  - Newlove No. 23.
  - Newlove No. 24.
  - Hill No. 3.
  - Hill No. 5.
  - Purissima No. 1.
  - Purissima No. 12.
  - Eefson No. 3.
  - Orcutt Oil Company No. 1.
  - Orcutt Oil Company No. 7.
- Santa Maria Oil Field (old) No. 1.
- Santa Maria Oil Field (old) No. 2.
- Santa Maria Oil Field (old) No. 3.
- Santa Maria Oil Field (old) No. 4.
- Santa Maria Oil Field (old) No. 5.
- Santa Maria Oil Field (new) No. 4.
- Union Oil Company (Nichols) No. 1.
- Todos Santos Oil Company No. 1.
- Esperanza Consol No. 1.

The term "edge water" is often used for lack of a better explanation of water difficulty. However, from the way the story is told, when certain Graciosa wells turned to water they did so in succession "up the dip." It is quite probable that a number of the 2d zone wells in the Santa Maria Field are affected by edge water. In such a case the only remedy is to deepen to the 3d zone, if conditions permit, sealing up the 2d zone formations. It is possible also that edge water is threatening the sands in the north end of Section 26 of the Palmer Union in the Cat Cañon Field.

I know of no particular case of water infiltration because of collapsed casing. Such condition is not impossible in some of the older wells, however. Such failures could be revealed in tests made under the conditions presented in "a" and "c."

FIELDS STUDIED.

For the purpose of more detailed description, the water conditions as presented in each field are taken up under the following fields in the Santa Maria District:

Santa Maria Field.—Field nearest Santa Maria in northern part of Los Alamos Rancho.

Cat Cañon Field.—Field surrounding the portal to Cañada del Gato in Sections 22–23–24–25–26 of T. 8 N., R. 33 W.; and Sections 29–30–31–32 of T. 8 N., R. 32 W.

Lompoc Field.—Purissima, Eefson and Hill leases of Union Oil Company; also Orcutt Oil Company and Pacific Oil Fields, Ltd., on Sections 28, 8–34 and 31, 8–34.

Casmalia Field—Southeast portion of Punta de Laguna.

SANTA MARIA FIELD.

Santa Maria, Rancho and Territory Running to North End of Casmalia Hills.

In the Santa Maria Field top water is logged at depths varying from 35 to 700 feet. It is usually in a Fernando stratum close to contact with Monterey shales. Top water, however, sometimes lies in the Monterey shales, as in the case of wells in the Hobbs-Pinal area. The top water is usually shut off with a string of 12½-in. casing. In some cases the 10-in. casing is also cemented. Generally the 10-in. casing serves as the second member in a double shutoff for top water. Rarely there is a showing of water in the blue shales at a depth of 1200 feet or less.

Water in the Second Zone.

The water which has caused most concern in the Santa Maria Field is that which appears in wells producing from the 2d Oil Zone. The 2d Oil Zone production comes from hard fractured shales. The water and oil strata in the 2d Oil Zone are so intimately related that in most wells it has been impossible to log them separately. Some operators claim that around the base of the Santa Maria Dome the oil and water were together before wells were drilled. Others claim that the water lies in a stratum beneath the oil reservoir and that, if the well is drilled carefully into the top of the producing zone, the production can be kept free from water. A number of 2d Zone wells that made water after being drilled in were plugged up with cement from bottom. In these cases the amount of water usually decreased, as did the oil also. In cases where the water is completely plugged off, the remaining oil production undoubtedly comes from the "Big Brown" shales which lie above the oil reservoir of fractured shales.

Practically all of the 2d Zone wells in the Santa Maria Field show the presence of water. There are a number of wells, of course, in which the percentage of water is not high. The water percentage, in fluid produced, in others runs as high as ninety. The 2d Zone water is salty. The wells in the southwestern quarter of the field show the most water. Those 2d Zone wells of the Union and Western Union oil companies, which are east or southeast of the synclinal trough—shown on our recent underground contour map of the 2d Oil Zone as running northerly from Western Union well No. 49 to Coblentz well No. 2—show a lesser tendency toward 2d Zone water trouble. There is an exception to this in a group of wells near Western Union well No. 56. This is probably a local condition and will be discussed under the subject "Group A."

It has already been stated that a number of 2d Zone wells have been plugged at the bottom. This was on the theory that the water lies in a stratum at the bottom of the 2d Oil Zone. The following data taken from various logs of wells are the only available clues as to the possible position of the 2d Oil Zone water:

Folsom No. 2 shows "water sand" from 2810 to 2813 ft. at the bottom of the 2d Zone oil sands.

Fox No. 5 shows "water sand" from 3090 to 3100 ft. at the bottom of 2d Zone oil sands.

Hartnell No. 2 shows "water sand" from 3065 to 3106 ft. at the bottom of 1230 ft. of brown shale of 2d Oil Zone.

Hobbs No. 1 shows "water sand" from 2825 to 2830 ft. at top of 3d Oil Zone under 125 ft. of blue sandy shale.

Squires No. 5 shows oil and water in brown shale at 2723 ft. at the top of the 2d Oil Zone.

Brookshire No. 7 shows water at 2988 ft. in bottom of 2d Oil Zone.

New Pennsylvania No. 7 shows water at 3045 ft. to 3050 ft. at bottom of 2d Zone brown shale.

Certain Graciosa Wells Log "Sand and Pebbles" at the Bottom of the Second Zone.

(This might be a water stratum.)

Graciosa No. 2, 2861 to 2906 sand and pebbles (oil sand).
Graciosa No. 3, 2815 to 2870 coarse sand and pebbles.
Graciosa No. 4, 3068 to 3106 coarse sand and pebbles.
Graciosa No. 6, 3140 to 3204 oil sand and pebbles.
Graciosa No. 7, 3308 to 3330 oil sand and pebbles.

The log of Harris No. 1 of the Pinal Dome Oil Company shows that at 3265 ft. the well pumped 99 per cent water. This was in brown flinty shale 400 ft. below top of the "Big Brown" of the 2d Oil Zone.

The theory of these Graciosa "sands and pebbles" being the water strata is supported by the fact that in a number of Rice Ranch wells certain strata are logged as gravel while in other Rice Ranch wells strata correspondingly similar as to depth are logged as water. The following are extracts from these Rice Ranch logs:

Rice Ranch No. 1 shows "gravel" 2860 to 2870 ft. (Bottom of 2d Zone.)
Rice Ranch No. 2 shows "gravel" 2940 to 2954 ft. (Bottom 2d Zone.)
Rice Ranch No. 7 shows "water" at 3325 ft. (Bottom 2d Zone.)
Rice Ranch No. 8 shows "gravel" at 3165 to 3170 ft. (Bottom 2d Zone.)
Rice Ranch No. 9 shows "water" at 3304 ft. (Bottom 2d Zone.)
Rice Ranch No. 10 shows "water" at 3395 ft. (Bottom 2d Zone.)
Rice Ranch No. 11 shows "gravel" at 2914 to 2917 ft. (Top 3d Zone.)
Rice Ranch No. 12 shows "water" at 3640 ft.

Undoubtedly the strata referred to in the Graciosa and Rice Ranch logs as "gravel" or "pebbles" were encountered by other companies but were logged differently.

There are a number of wells in the Santa Maria Field which, because of their distance from other wells or because they are the only ones, in certain groups, making a considerable amount of water, could be treated as isolated cases. In the isolated cases thorough examinations should be made to determine the condition of casings. It is probable that in some of these cases there is defective casing or cementing jobs have not held. Possibly, in some of the 3d Zone cases, the finishing string was not carried deep enough to seal off all 2d Zone water before landing.

Group Cases.

There are several places in the Santa Maria Field where excessive water shows in wells which can be grouped together. (The identity of the wells in the following groups will be given, upon application, to the companies directly interested.)

Group A.—Five wells in north central portion of the Western Union Oil Company property.

It would seem probable that one of the wells within the group is responsible for the water trouble. It may be possible that the abandoned well within this group is the source of excessive water. The wells all produce from the 2d Oil Zone. They are on the southerly slope of the Western Union dome as shown on the underground contour map of this 2d Zone and normally would not be expected to be water wells. This Group A is one in which dye tests could be made to good advantage.

Group B.—Four line wells on Western Union Oil Company and Union Oil Company (Newlove) properties near northwest corner of Western Union Oil Company property.

The four wells in Group B all produce from the 2d Oil Zone. The underground contour map shows that these wells are drilled into the sharp synclinal fold which runs from this group in a northerly direction through the property known as the Coblentz. It is quite probable that the water trouble in these wells is a natural one, due to the synclinal structure. Before this idea is accepted it would be well to subject these wells to a series of dye tests.

Group C.—This group includes an area extending from the northwest corner of the Western Union Oil Company property westerly along boundary line between Union Oil Company (Newlove) and Pinal Dome Oil Company (Graciosa) properties.

The fifteen wells which have been included in Group C all produce from the 2d Oil Zone. Two of these wells, Union No. 5 and Union No. 17, are to be deepened into the 3d Oil Zone.

This group includes the present producers of the Graciosa lease, formerly the property of the Producing and Refining Oil Company.

The 2d Zone contour map shows that these wells lie on the contours which run into the synclinal fold already mentioned in the discussion of Group B. It is claimed, for example, that the Graciosa wells when first drilled were good clean producers. Some of them were shut in shortly after being completed and when they were put on the beam again they pumped water. It is stated that those "down the dip" went to water first. It might be that the synclinal fold previously mentioned is a water reservoir and that, as the oil was drawn from the 2d Zone, the water in this reservoir moved out to take its place.

Water infiltration in this group seems to be general. It is probable that the only remedy here is to deepen into the 3d Zone, being careful to carry deepening string of casing far enough below the 2d Oil Zone to cement off all water. It is probable that the 3d Oil Zone sands could be reached in these wells at depths varying from 3200 to 3700 feet. This excepts Graciosa No. 17 which probably would have to be drilled to 4200 feet for 3d Zone production.

Of course it is possible that a water condition, similar condition to that now existing in the 2d Oil Zone, might be found in the 3d Zone, but the campaign of deepening which already has been carried up to the border of this group proves the developed conditions to be to the contrary. Union Oil Company well No. 12 (Newlove) is 1000 feet north of the nearest well in this group. This well when deepened into the 3d Zone came in at the rate of 2400 barrels per day, clean oil.

Group D.—Includes all of the wells of the Union Oil Company Escolle and Squires properties and also several line wells of the Pinal Dome Oil Company (Pinal) property, adjoining.

In Group D there are 6 wells deepened into the 3d Oil Zone and 19 wells are drilled only to the 2d Oil Zone. The condition here seems to be similar to that in Group C. One former big producer in this group is now a water well. Although nearly all the wells in this group show high percentage of water, they are at considerable distances from each other. This would lead one to think that the water trouble is more of the edge-water nature than that due to faulty conditions in one or more wells.

Group E.—Includes 5 wells of the Pinal Dome Oil Company property (Pinal) and extends across the southern portion of the Union Oil Company properties (Fox and Hobbs) and includes the northwestern portion of the Pinal Dome Oil Company ("A") property and 3 wells of the Union Oil Company (Hobbs) property north of the north line of Pinal Dome Oil Company ("A").

In Group E there are three wells in the 2d Oil Zone and nine wells drilled into the 3d Oil Zone. There are several wells in this group which present a condition which seems to be peculiar to this part of the field. The surface waters here lie at the base of what is called "red rock." This "red rock" is burned shale. Sometimes it is more nearly black than red. It was produced by the combustion of its hydrocarbon content. Probably because of certain chemicals leached from these burnt shales this water is highly corrosive. In several wells in this group the two upper strings of casing were corroded and eaten through. One of the wells, Hobbs No. 3, was abandoned because of this. In all of the affected wells repairs were difficult to make. It is possible that other wells in this group are thus affected at present. This same condition may exist in other parts of the field, although with a slower rate of corrosion.

The following is a brief account of the surface water difficulty in this group:

In the Pinal Dome A–2 top water ate through 12½″ and 10″ casings in February, 1912. This hole was started in September, 1906. The two strings of casing lasted about 5½ years.

In Pinal Dome A–3 top water ate through 12½″ and 10″ casings in April, 1914. The drilling of this hole was started May 23, 1907. These two strings lasted about 6½ years.

In Hobbs No. 2 surface water ate through 12½″ and 10″ casings in June, 1910. Started drilling this hole July 23, 1904. Well cemented for casing trouble July 24, 1910. These two strings lasted about 6 years.

In Hobbs No. 3 surface water ate through 12½″ and 10″ casings October 19, 1912. This well was completed May 20, 1905. These two strings lasted about 7 years. After attempts to repair this hole it was abandoned with 440 sacks of cement in May, 1913.

In Hobbs No. 4 surface water ate through 12½″ and 10″ casing in latter part of 1910. This well was completed July 31, 1905. The two strings of casing lasted about 5 years.

In the above cases the average life of two strings of casing was about 6 years. Of course this is a peculiar occurrence but it raises the question as to what is the condition of some of the surface strings of casing in the Santa Maria Field that have been in the ground ten years or more. Several operators have been questioned on this subject but none of them know of any casings similarly affected outside of this group of wells.

Group F.—Two offset wells on Hobbs-Fox boundary line of the Union Oil Company of California.

This group is another case in which dye tests might show cause of water infiltration. One of these wells is drilled into the 2d Oil Zone, the other into the 3d Oil Zone.

Group G.—Several wells on the Brookshire Oil Company property.

The same remarks apply as to Group F. The neighboring wells to the west are among the cleanest and best producers in the Santa Maria Field. One of the wells in Group G is in the 2d Oil Zone, the other is in the 3d Oil Zone.

Group H.—Six wells in area surrounding common corner of Union Oil Company (Folsom and Squires) properties and Pinal Dome Oil Company (Pinal) property.

The wells in Group H are all in the 2d Oil Zone. It is probable that there is a complication of water troubles in the wells of this group. Their nature could be determined only by a series of dye tests and examination of casings.

Group I.—Two off-set wells along north-south boundary line between Pinal Dome Oil Company "P" and "A" properties.

The two wells in Group I should be tested with dyes and packers for casing troubles.

First Oil Zone Production.

There are 11 wells of the Western Union Oil Company drilled to depths averaging about 1600 feet. The production from these wells is small. It comes from brown shales of what is known as the 1st Oil Zone. The production is free from water.

The following are these 1st Oil Zone wells:

Western Union Oil Company's wells Nos. 4, 6, 7, 8, 9, 10, 11, 12, 15, 17 and 19.

There are a number of wells in the Santa Maria Field which are perforated for this 1st Zone production but are drilled down into the 2d or 3d Oil Zones. These Western Union wells are the only producing wells not drilled deeper than the 1st Oil Zone. It seems evident that none of these wells have been affected by top water.

CAT CAÑON FIELD.

The principal top water sand in the Cat Cañon Field is a continuous stratum covering the whole area and lying almost flat. This stratum lies about 150 to 200 feet above the sea level. Occasionally there is a water showing logged at a depth of 800 to 1200 feet. The water situation in Cat Cañon is not alarming.

The oil production comes from real sands at depths varying from 2400 feet, at the top of the anticline, to 3100 feet on the north flank. A number of wells have been drilled into bottom water below these sands. The bottom water does not offer the difficulty, however, that the Zone water does in the old field. In most cases it has been plugged successfully.

It is claimed that some of the wells in the north end of the Cat Cañon Field are gradually going to water in succession, "Up the dip." This would seem to be an edge water proposition. It is probable, however, that some one of several of the abandoned wells in this area is the offender.

In the group of wells lying around the common corner of Sections 29, 30, 31 and 32 in T. 9 N., R. 32 W., several strata of top water were encountered. These water sands are all logged at a depth of less than 1200 feet. Cross sections made through wells in this group do not show any plausible relation between the top water sands logged in various wells. This necessitates careful prospecting with cable tools.

About 1½ miles south of the southwest corner of Section 25, 9–33 the Union Oil Company well, Bell No. 7, was drilled into bottom water. This bottom water was plugged successfully. The well is now producing a clean 16-gravity oil.

LOMPOC FIELD.

The water conditions in the Lompoc Field are very similar to those in the Santa Maria Field. The usual method used to overcome water trouble has been to cement the well up from bottom; cementing and testing, up the hole, until the water is gotten rid of. It seems probable that the water here lies in sands right at the contact between Vaqueros and Monterey. In some of the wells there is a small showing of top water at shallow depths and some of the logs show water in shales at a depth of 1200 to 1600 feet.

From the record of wells drilled by the Union Oil Company, in this field it would seem that the proper procedure would be to stop drilling as soon as the bit covers itself in the producing sands. Wherever drilling has gone forward through the sands it has been necessary to plug up the hole with cement to shut off water.

The Pacific Oil Fields, Ltd., on Sections 31 and 28 in T. 8 N., R. 34 W., is now abandoning all seven of the wells of this property. This work is being done under the direction of this department and in a manner satisfactory to the neighbors of the Pacific Oil Fields, Ltd., the Union Oil Company and the Orcutt Oil Company.

CASMALIA FIELD.

Operations in the Casmalia Field are being conducted by the Casmalia Syndicate, the Pinal Dome Oil Company and the Standard Oil Company.

A top water at depth of 35 feet is the only one logged to date. The production in the Casmalia Syndicate area comes from a depth of 1800 to 2000 feet.

ARROYO GRANDE FIELD.

There has been renewed activity, of late, in the Arroyo Grande Field—between Pismo and Edna. Two of the older properties have gone into new hands. Oil wells are being tried for production and new wells drilled. The production from this area during the past year was small.

Water Conditions.

It is claimed that some of the older wells in this field have water trouble. Information thus far received has been conflicting.

In a new well recently drilled on the Bickmore tract surface water was shut off with a 57-foot string of 12½″ casing and the well was then finished into producing sands at 800 feet, without further indications of water.

The nature of the formations in the Arroyo Grande Field, that is, the absence of thick beds of shale and clay, requires careful planning in order to find suitable formation for water shut off before going into the oil.

One company in this field planned on landing a string of 10″ casing before going into the oil sand. No suitable landing place, in fact, nothing but sand was encountered. Fortunately the water had been shut off before the 10-inch was started.

BITUMINOUS MONTEREY SHALES OF THE SANTA MARIA DISTRICT.

Purpose of this Paper.

In studying the logs of oil wells drilled in the Santa Maria District and from conversations with many persons engaged in the work of drilling oil wells and recording the logs thereof, it was noticed that the Monterey formations drilled through were classified mostly as ''blue'' or ''brown'' shales with occasional interbedded layers of shell. By means of a series of geologic cross-sections, drawn from the logs of wells, an attempt was made to correlate these ''blue'' and ''brown'' shales and determine, if possible, their relation to the oil zones. The results of this work give a very good idea of the general structure of the Monterey shales and the relative positions of the bituminous brown shales.

The conditions revealed are, in some instances, considerably at variance with data given in early reports on the Santa Maria District. This is due, no doubt, to scarcity of data on underground conditions at the time these earlier reports were made. *The chief record used by the writer in the study of underground conditions of this district has been that of the drill.* It is this same instrument which ultimately proves or disproves the theories of geologists and engineers relative to the occurrence of economic quantities of petroleum. There have been several admirable reports written which give a detailed study of the geography, topography, geology, paleontology, etc., of the Santa Maria District, and it is not the purpose of this paper to attempt an elaboration upon any of these subjects but to offer additional clues as to the probable position of petroliferous strata.

Geologic Formations.

Before discussing the above-mentioned results it might be well to give a brief description of the three geologic formations intimately associated with petroleum in the Santa Maria District, namely: (1) the Vaqueros, Sespe and Tejon, undifferentiated (Eocene-Miocene); (2) Monterey (middle Miocene); (3) Fernando (Miocene-Pliocene-Pleistocene).

(1) The Vaqueros is composed principally of sandstones, shales and limestones. The whole formation is said to be over five thousand feet thick. The gray sands of the Vaqueros, interbedded with gray and blue shales, just a few hundred feet below the contact with the base of the Monterey, form a reservoir for petroleum. This is known as the Third Oil Zone in the Santa Maria Field.

(2) The Monterey is composed of shales and rare lean strata of sand, varying from those of a siliceous flinty nature, predominating in the lower portion of the series, through sandy-brown and blue shales to the soft chalk-like diatomaceous shales of the upper Monterey. The entire series is between 5500 and 6000 feet in thickness. Petroleum has been stored in the fractured flinty shales at the base of the Monterey, in contact with the Vaqueros. This position is known as the Second Oil Zone in the Santa Maria Field. The First Oil Zone, in the Santa Maria Field, lies about 1000 feet above the Second Oil Zone. It is from the First Oil Zone that the oil seepages and asphaltum deposits of the Santa Maria dome originate.

(3) The Fernando overlies the Monterey throughout a large portion of the Santa Maria District. This formation is composed of sand, conglomerates, clay and shale. The Fernando lies unconformably upon the Monterey. The sand, clay and gravel of the newer portion of the Fernando lie, in gentle dips, unconformably upon the conglomerate and shale of the older Fernando. The dips of the latter conform more nearly to those of the Monterey. However, the writer has observed contacts where the Fernando conglomerates lay in a gently dipping position upon almost vertical Monterey shales. Only in a broad sense are the dips of the Fernando indicators of the position of the underlying Monterey. In some parts of the Cat Cañon Field, and elsewhere, the Fernando formation has offered reservoirs in its loosely formed sand strata for petroleum accumulation. Wherever found, this oil is of a heavy Baumé gravity and, because of this and the unconsolidated nature of the formations, presents considerable resistance to economic production.

General Characteristics of Blue and Brown Shales.

A number of samples of blue and brown shale, taken from drilling wells and outcrops, were examined to determine what are their differences in composition and physical characteristics.

The blue shale, especially in that part of the series between the First and Second Oil Zones of the Santa Maria Field—known as the "Big Blue"—are very fine grained, compact and free from grit. These shales, under the microscope, show a great uniformity in texture and appear to be the result of sedimentation of volcanic ash or very finely divided erosive material of igneous origin. Samples of blue shale were examined under a high power microscope and no evidence could be found of the remains of diatoms or other minute organisms. There are undoubtedly diatomaceous strata in the Monterey which in drilling would be logged as blue shale but the samples examined show that the Monterey can not be classified throughout the series as entirely organic.

The brown shales are almost invariably bituminous, varying from a trace up to the point of yielding petroleum in producing quantities. It is hardly necessary to say that the bituminous material gives them the brown color. The brown shales are usually more porous than the blue shales. The stratum, known in the Santa Maria Field as the "Big Brown," which lies just above and grades into the 2d Oil Zone and is immediately under the "Big Blue," mentioned above, changes from a very compact shale at the top into a sandy shale and finally into the flinty "sand" of the 2d Oil Zone. The "Big Brown" is much easier to drill than the "Big Blue." Several drillers have stated that the drilling conditions are so different that it is possible to tell, with cable tools, when the drill enters the brown shale without "pulling out."

Cross Sections.

One of the series of geologic cross sections mentioned in the opening paragraph of this paper is herewith shown. (Fig. 20.) For the purpose of these cross sections only the brown shales are shown in hachure. The brown and blue shales predominate. The shales of other color or designation are of little importance in an extended correlation. This cross section runs along the northern boundary line of the Newlove lease of the Union Oil Company of California. Data are taken from the logs of line wells of the Escolle, Squires, Folsom and Newlove leases of the Union Oil Company of California, the Rice Ranch Oil Company, the New Pennsylvania Petroleum Company and Coblenz Oil Company.

Near the surface, that portion of the cross section, shown as sand and clay, practically defines the thickness of the Fernando formation in the Santa Maria Field. The contact of Fernando and Monterey is at the base of these sandy strata.

The first principal body of brown shale below the Monterey-Fernando contact, running arch-like across the section, represents the First Oil Zone. It is from these shales that the shallow Western Union Oil Company wells, farther down in the dip, obtain their production. It can be seen from this cross section that the bodies of asphaltum, encountered in drilling near the top of the dome, are the residual component of the petroleum once confined in these shales.

Below the brown shale of the First Oil Zone the drill enters a body of blue shale, of variable thickness, known as the ''Big Blue.'' The characteristics of this Big Blue shale are given elsewhere in this paper.

Underneath this body of blue shale is the ''Big Brown'' of the Second Oil Zone. Within this ''Big Brown'' shale, and sometimes at the base of it, are shown the continuous oil strata of the Second Oil Zone. It is probable that the contact between Monterey and Vaqueros formations is close to the bottom of these fractured flinty oil strata.

The oil strata shown below the 2d zone oil formations are gray oil sands of the Vaqueros. In this particular cross section most of the logs show brown shale between the Second and Third oil zones. However, in a number of the wells drilled into the Third Oil Zone, gray shale instead of brown shale is logged between the two oil zones. It is into these third zone sands that deepening is giving such good results.

The cross sections show that the brown shales indicate the horizons of petroliferous saturation. In many wells oil is produced from these shales. The brown shales usually are firm yet porous. A well will yield production from several hundred feet of open hole without caving. There is a certain amount of production taken from the blue shales. This oil probably has migrated from the main zones, through fractures, into crevices in the blue shale.

Origin of Petroleum.

It is possible that petroleum originated in certain portions of the brown shales. Some of the samples of brown shale examined were highly diatomaceous while others showed very little evidence of organic remains. The sharp flinty shales of the Second Oil Zone in the Santa Maria Field seem to have been derived from the intense compression of the siliceous skeletal material of diatoms and other organisms. The petroleum in the Second Oil Zone may be very close to its place of origin.

Relation of Fernando and Monterey.

Where exposures of both Monterey and Fernando can be identified at the surface the well cross sections in these localities furnish a definite idea of the continuation and relation of the Monterey and Fernando strata below the surface.

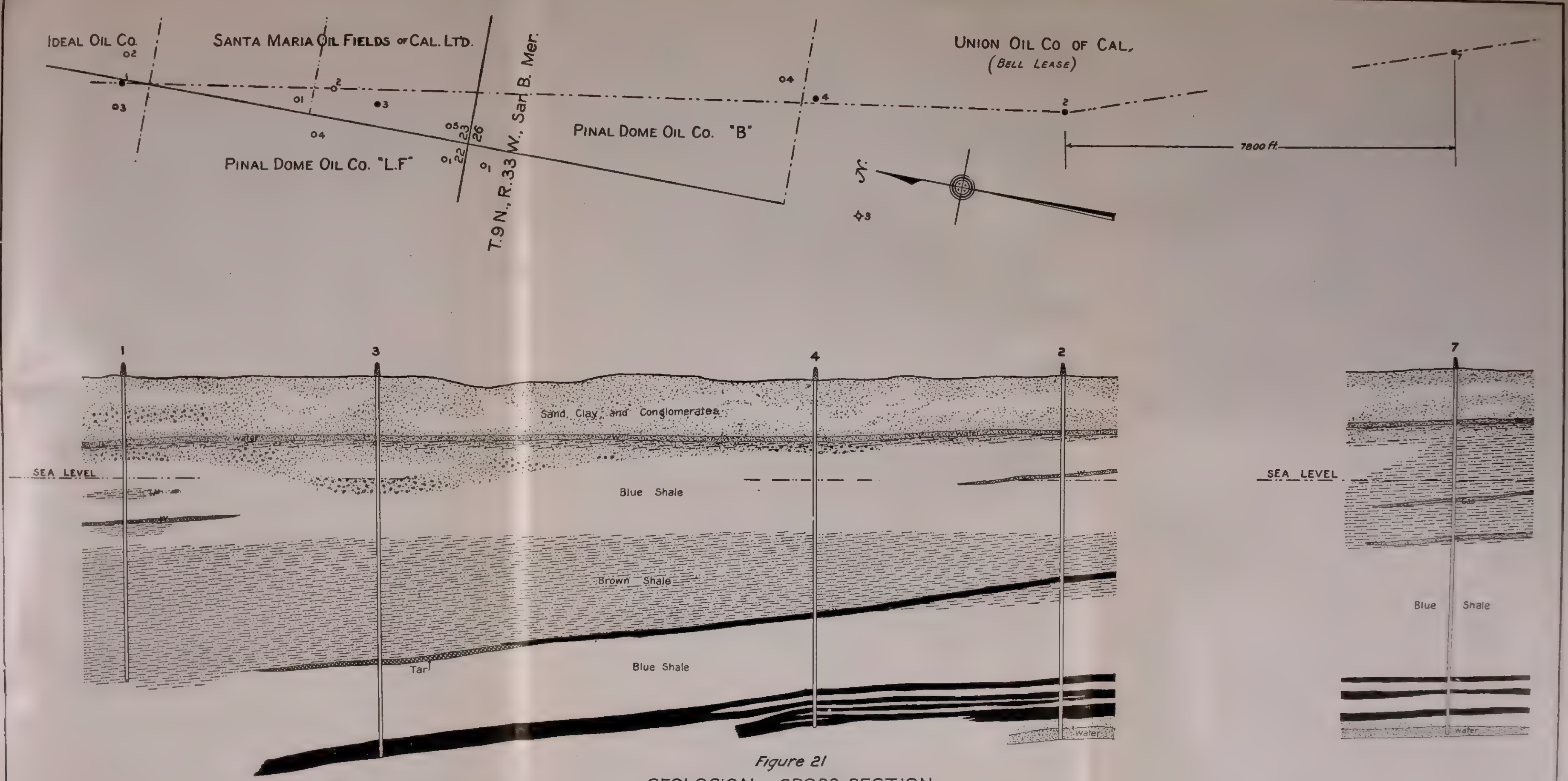


Figure 21

GEOLOGICAL CROSS-SECTION
IN THE
CAT CAÑON OIL FIELD
SANTA BARBARA CO CAL

Scale
500 0 500 1000 1500
(feet)

by R.E Collom - April, 1916

CALIFORNIA STATE MINING BUREAU
FLETCHER HAMILTON, State Mineralogist.
Department of Petroleum and Gas.
R.P. McLAUGHLIN,
State Oil and Gas Supervisor

The Monterey formations in the Santa Maria Field lie in dome structures. This has been demonstrated by an underground contour map—scale of one inch to five hundred feet—of the Second Oil Zone, which is the most continuous oil-holding formation in the Santa Maria Field. These contours show at least two principal domes with corrugations or short anticlines plunging away from their apices in various directions. From this demonstration it would be reasonable to expect the occurrence of dome structures in the Monterey in other parts of the Santa Maria District.

The foldings of the Fernando, as evidenced from surface dips, are more regular in contour and do not conform entirely to the disposition of the Monterey. If one were to rely entirely upon the surface evidence as presented by Fernando, it would be concluded that the Santa Maria Dome was formed by an anticline plunging in opposite directions from a high point approximately under Mount Solomon. As a matter of fact, in so far as the position of the Monterey is concerned, Mount Solomon has no connection whatever with the dome structure. At best it is simply a topographic feature in the Fernando and a misleading one to the oil prospector.

In some parts of the Santa Maria Field the Fernando attains a thickness of over six hundred feet. In the Cat Cañon Field the Fernando is much thicker and at no place is the Monterey exposed. A comparative study of the well cross sections in the Santa Maria Field and the Cat Cañon Field shows that the main oil reservoir in the Cat Cañon Field is in fine sands which in many respects are similar to those of the Vaqueros or Third Oil Zone in the Santa Maria Field. These are true sands and entirely different from the material of the Second Oil Zone in the Santa Maria Field.

An attempt has been made in one unpublished cross section to correlate the bituminous shales of the Santa Maria Field with those of the Cat Cañon Field. According to this section it would seem that the upper brown shales of the Cat Cañon Field correspond to those of the First Oil Zone in the Santa Maria Field, while the "Big Blue" and "Big Brown" of the Santa Maria Field have merged rather indefinitely into the blue shales of the Cat Cañon Field above the producing sands. This would identify these sands as Vaqueros rather than Fernando as they have been named by some authorities. It is quite possible that this correlation is incorrect.

The importance of identifying these Cat Cañon oil formations rests with the proposition that if they are in the Fernando the prospector would be insured considerable anticlinal continuity and could venture to greater distances from proven areas than would be possible—considering the dome structures of the Santa Maria Field—if the oil formations are at the base of the Monterey or in the Vaqueros, lying more or less conformably under the Monterey.

FUTURE DEVELOPMENTS.

There are large areas within the confines of the present proven fields of the Santa Maria District which are yet to be drilled. Exploration at the present time is confined to deepening and a moderate amount of drilling in areas practically unproved.

Where deepening is going on in the Santa Maria Field the wells are being carried into the Third Oil Zone in the Vaqueros formation. It is possible that later on some of the companies operating on the top of the dome may decide to drill test wells even deeper than the sands being entered at present. In general, where deepening is going on, the Second Oil Zone, which has developed a large amount of water, is being sealed off with cement and a clean high-gravity production is being gotten from the gray sands of the Vaqueros.

There are several localities in the Santa Maria District which are still to be tested with deep holes efficiently drilled before it can be said that they are barren of petroleum. A number of wild cat wells drilled in the past in this district gave only passively negative results because they were drilled without properly testing possible oil formations.

Shale Production.

A considerable amount of production, as has been stated already, comes from the brown shales themselves. This is especially true of what is known as the ''Big Brown'' in the Santa Maria Field. One company recently deepened a shallow First Zone well and, upon entering the ''Big Brown,'' got such a good flow of high-gravity oil that it was decided to suspend present deepening operations and produce in this well from the brown shale.

In many cases where the Second Zone production has gone to water the bottom of the well has been filled with cement for quite a distance up into the brown shale where a fairly clean, although considerably diminished production could be gotten.

Naturally the rate of flow of oil from these shales must be much slower than from fractured or sandy formations. When it is taken into consideration that one hundred feet of hole in this firm shale formation, from six to eight inches in diameter will give roughly from one hundred fifty to two hundred square feet of filtering surface, which, unlike sand production, as the oil moves in toward the hub, will gradually become clogged with small particles of loose material tending to retard percolation and decrease production, it would seem that some means should be tried to increase the open areas in the well and thereby the production.

Shooting Shales.

Several companies have considered dynamiting these oil-bearing shales to increase the production. One company at the present time is dynamiting the "Big Brown" in three wells. It is the writer's opinion that it is an experiment well worth trying and may prove to be the means of reclaiming a large amount of the Second Zone oil, which because of water, is being sealed off.

If this experiment proves successful, the Second Zone proper, containing the oil and water, can be filled from the bottom up into the brown shale with cement. Then at a safe distance above the cement plug torpedoes can be fired which will fracture the brown shales. The well can then be cleared out and, after placing a screened liner which might be necessary, tried out for production.

Second Zone Water.

It is probable that water originally was present, down the dip, in the lower strata of the Second Zone. There is no information in any of the logs examined that definitely distinguishes separate oil and water strata. The water is salty and is produced from some wells in emulsion.

CHAPTER VI.

SPECIAL SUBJECTS.

1. Methods of Shutting Off Water.
2. Strength of Casing.
3. Failure of Derricks.
4. Gasoline Plants in the Midway Field.
5. Gasoline Extraction from Natural Gas by Absorption Method.
6. Federal Action.
7. Statistics of Oil Production.
8. Prices of Crude Oil.
9. Directory of Oil Companies.

METHODS OF SHUTTING OFF WATER.

The following descriptions and statements relative to methods of shutting off water are written by several members of the bureau staff, namely R. B. Moran, M. J. Kirwan, R. D. Bush and R. P. McLaughlin.

In most of the oil fields water is found in the formations overlying the oil sands. There are a number of methods in use for excluding this water from the wells. Local conditions must be taken into account in the choice of method used in any particular case. Shallow wells are often successfully handled by landing the casing in impervious strata, but in deep drilling in California in the majority of cases hydraulic cement is used.

Formation shutoff is the term applied to a shutoff where casing is landed in a bed of shale or clay without using cement or other device to plug the space between the casing and the wall of the hole. Much depends upon the kind of casing shoe which is used. It should be a plain shoe as distinguished from the notched Baker shoe, and from the types used in rotary drilling. A shoe 14″ to 20″ in length is usually used, although in a few cases in deep work shoes from 6″ to 20″ in length have been tried. It is important not to have the largest diameter of the shoe at the bottom, so that it can be driven tightly into the formation. When a suitable shale or clay is reached where it is desired to land the water string, the hole is drilled ahead with a smaller sized bit and the casing is driven until the shoe is tight in the formation. This will prevent the water from following down the outside of the casing and entering the well.

At the first departure from the simple formation shutoff, clay and chopped rope were put in to fill and seal up the space between the shoe and the wall. A practice in vogue before the use of the cement, but now obsolete, was to make a landing on a hard lens or ''shell,'' as it is usually termed, depending on a bag of flaxseed to seal up the space around the shoe. The hole was carefully trued up and cuttings removed, then the seed bag was lowered into the hole and casing landed on it. The swelling of the seed upon taking up water was depended on to hold back the water long enough to allow the mud to settle and the formation close in enough to make a permanent job.

Tamping is a method which has been in use a number of years but which now has but few followers. A complicated expanding packer is put on to the oil string where it is desired to make a shutoff. This point, however, must also be below the next larger string of pipe. The packer is made of canvas and might be described as an inverted umbrella. Sand and pulverized shale is then run in between the casings by means of a stream of water. The outer string must be moved up and down all the time, both for the purpose of keeping the material introduced moving down to the bottom of the hole and for the purpose of tamping it tight between the shoe. As the space below fills up, the tamping string is removed joint by joint. This operation takes from three to six weeks. A few men advocating the practice claim that the casing recovered repays the labor involved. It is also evident that by this means, a string of casing is saved, the last string serving as both the oil and water string. It is readily seen to be a process which would only be applicable in drilling where formations stand up sufficiently to allow the removal of casing at will. An interesting sidelight on conditions which are sometimes encountered is given by the statement that 70 cubic yards of sand were used in filling up a space behind a single 20″ length of 8″ pipe.

Hydraulic cement is now being generally used in California for excluding water from oil sands. What is called the "dump bailer" method is the simplest in use. The hole is first trued up and carefully cleared of cuttings in case the work is done at the bottom of the hole. If the hole has already been carried below the shutoff point it is necessary to put a bridge in, or in other words, a false bottom in the hole. The casing is raised off the bottom. Thirty or forty sacks of cement, mixed to the consistency of thin gruel, are lowered to the bottom by means of the dump bailer. The casing is then filled with water to the top and a cap screwed on, then when the string is lowered to bottom, the cement is forced out behind the casing. Time is allowed for the cement to set. after which any that has been left in the hole is drilled out. If the displacements have been accurately figured this will leave only a few feet on the inside of the casing which gives little or no trouble in drilling out. One of the advantages of this method is the fact that where mud has been used in drilling, this mud can be left behind the casing. It is the usual practice in some fields to put in a few barrels of clear water in advance of the cement so as to give it a better chance to set without being mixed too much with mud. In experienced hands this method has scored a large percentage of successful shutoffs, even in deep territory. The amount of cement used is necessarily limited and consequently the method is applicable only to cases where there are no large cavities to be filled, such as often occur in redrilling or other troubles in wells.

The pumping in of cement by pressure pumps is the method in most general use. For this purpose complete outfits are mounted on auto trucks and steam connections are made with the boiler at the well. Two pumps are generally used. The work is generally started with a pump capable of delivering a pressure of 300 to 400 lbs. and finished with one capable of 700 to 800 lbs. The cement is mixed in a portable mixing trough. Neat cement is used and it is mixed to the consistency of thin gruel.

There are a number of variations as to the details of the method. In all cases it is important to true up the bottom of the hole and remove the cuttings. The casing is raised a few feet from the bottom, while the cement is being pumped and then it is lowered to position, after the cement is in place. Some operators circulate water prior to running in the cement until the clear water comes to the surface outside the casing. Others leave as much circulated mud in the hole as possible, only pumping in a small amount of clean water in advance of the cement in order to prevent the mud mixing with the cement, the idea being to leave this mud to settle around the casing and thus prevent the movement of waters from one stratum to another.

An early method, now little used, was to pump cement through tubing, a packer being placed at the bottom of the casing, to prevent the return of the cement between the tubing and the casing. An improvement on this method, now extensively used, is to pump the cement through tubing which passes through a casing head, provided with a release and fitted to the top of the water string. The tubing is lowered to within a few feet of the casing shoe, the distance depending on the amount of cement it is desired to leave in the casing. Water is pumped in to get circulation outside the casing and then the casing head release is opened and the casing pumped full of water, which prevents the cement from coming up between the tubing and the casing and forces it outside the casing, when the release is closed. After the cement is in and displaced from the tubing with water, the casing is lowered in place and all connections closed until the cement has taken its initial set, to prevent a possible return of the cement around the shoe. There are two methods of determining when the cement has been displaced from the tubing. First, to calculate the capacity of the tubing and measure the required amount of water; and second, to reduce the diameter of the lower end of the tubing with a swedge nipple. A wooden plug is then put in after the cement and ahead of the displacing water. When the plug reaches the swedge nipple and the cement is out, the pump pressure jumps up and the circulation stops.

The majority of the operators now pump the cement directly into the casing and then displace it and force it out behind the pipe by filling it up with water. Some operators figure the contents of the casing and stop the pumps when the calculated amount of water has been pumped in. In some cases the water is measured with a meter, while others consider this too risky and measure the water in tanks thus having the exact quantity at hand. One case came to our notice where it was discovered that the meter was not working after the cement had been pumped in. Water was then pumped in until the cement was returned to the surface outside the casing.

In another method, two wooden plugs about three feet long are used. They are made to fit tightly against the casing by means of rubber belting. The plugs are introduced by means of special arrangements of gates and fittings. The first plug is started down the casing ahead of the cement to prevent the water and cement mixing. The casing is raised off the bottom high enough to allow this plug to pass clear out of the casing. The second plug is introduced after the cement is pumped in and the casing lowered so that it will not be passed out of the casing but come to rest on the other plug and thus run up the pressure of the pumps when all the cement has left the casing. In using this process it is customary to measure the water pumped in behind the second plug as a check on its progress.

The amount of cement used varies from five to thirty tons, according to local conditions. On an ordinary job without any complications resulting from caving, ten to fifteen tons are used. Most operators use larger quantities than would be needed for the simple purpose of plugging off water behind the shoes, because it serves to re-enforce the casing by filling the space between the casing and the wall and also prevents corrosion from mineral waters. It is not uncommon to find in redrilling or abandonment of wells where large amounts of cement have been used, that the cement has followed up the casing as much as 1000 feet. In a few cases where formations showed decided tendency to collapse casing in completed wells, as much as thirty tons have been used in the hope of holding back the walls and preventing this collapse.

The shutting off bottom water is a different problem and usually a much more difficult one than presents itself in shutting off top water. Oil sands have been drilled through and the operator often has to contend with gas, loose sand, sidetracked or slivered casing. The hole must first be cleaned out and if any casing was left in when the oil string was pulled, it must be shattered with dynamite and plugged up above the water sand. Some operators have been successful by putting in rope, brick, etc., and tamping down thoroughly with the tools and on top of that as a foundation, tamping down a mixture of cement and lathe cuttings put in dry in tin cartridges. These are broken up and the cement mixed with water in the hole, by the tools. Others have been successful, simply dumping in neat cement with a dump bailer, up to the bottom of the lowest oil sands.

Probably the best method and the one that has met with success under the most difficult conditions, is by pumping the cement through tubing, which enables the operator to put it under pressure and force it out into cavities and channels that would not otherwise be filled with cement. The outfit is similar to that described above for cementing a water string with the tubing and casing head and in addition, the space between the oil and water string is packed off at the bottom of the water string, thus preventing the cement from coming up between these two casings and is so constructed as to allow the movement of the oil string through it if that is desired. In using this method it frequently happens that the oil sands above will absorb considerable water and continue to do so until the cement comes up and shuts this off to some extent, causing the pump pressure to rise and forcing the cement into the formation below. Thus the oil sands become somewhat deadened and it may be some time before the former production is obtained from these sands, however, it is not believed that the cement forms a solid well around the casing in the oil sands, which would shut out all the oil, for the reason that there is sufficient gas and movement of the cement to keep it from setting. Some operators advocate mudding up the oil sands first in order to keep the cement out and prevent circulation, but this would, no doubt, prevent the return of the oil to a greater extent than the cement.

The most difficult problem the operators have to deal with is the case of a water sand between oil sands, where it is desired to produce from the lower oil sand and give the upper oil sand the proper protection from water. In many cases this would require two additional strings of casing, generally reducing the diameter of the hole, in some cases to an impracticable size, the original oil string being cemented above the water sand, one additional being cemented below the water sand, and one additional for the new oil string. One operator in the Coalinga field successfully solved this problem in one well with one string of casing, giving the lower sand a test which, however, proved nonproductive. The original oil string was cemented below the water sand, enough cement being put in to go above the water sand, and cement the casing in the overlying shale. The lower oil sand was bailed dry and later that portion of the hole below and a few feet up into the water string was plugged up with cement. Then the casing opposite the upper oil sands was perforated and tests proved that these oil sands were free from water.

Amount of Cement Necessary.

The amount of cement required to fill certain spaces in an oil well should be approximately known when a job is commenced and the following table, where the space is exactly stated, can be used for such a purpose. In actual practice the exact cavity may not be known. The table is based on the fact that a sack of cement, weighing about 100 pounds, will occupy about 1.1 cubic feet after being mixed with water and allowed to set.

Lineal Feet Filled by One Sack of Portland Cement Alongside of Oil Well Casings.
(One sack equals 1.1 cubic feet neat cement when set.)

Size of casing		Diameter of well (excess over casing diameter)					
Normal	Actual outside diameter	One inch	Two inches	Three inches	Four inches	Five inches	Six inches
	Inches	Feet	Feet	Feet	Feet	Feet	Feet
4¼-inch	4.75	19.2	8.8	5.4	3.7	2.8	2.2
4½-inch	5.00	18.3	8.4	5.2	3.6	2.7	2.1
5⅝-inch	6.00	15.5	7.1	4.4	3.2	2.4	1.9
6¼-inch	6.625	14.2	6.6	4.2	2.9	2.2	1.7
6½-inch	7.00	13.5	6.3	4.0	2.8	2.1	1.7
7⅝-inch	8.00	11.9	5.6	3.5	2.5	1.9	1.5
8½-inch	8.625	11.2	5.2	3.3	2.4	1.8	1.4
9⅝-inch	10.00	9.7	4.6	2.9	2.1	1.6	1.3
10 -inch	10.75	9.0	4.3	2.8	2.0	1.5	1.2
11⅝-inch	12.00	8.1	3.9	2.5	1.8	1.4	1.1
12½-inch	13.00	7.5	3.6	2.3	1.7	1.3	1.0
13½-inch	14.00	7.0	3.4	2.2	1.6	1.2	1.0
15½-inch	16.00	6.1	3.0	1.9	1.4	1.1	0.9

Mud Laden Fluid Method.

The term "mud laden fluid" herein used applies to a mixture of clay with water, the water carrying the finely divided clay in suspension in quantities varying from 5 to 25 per cent.

Mud laden fluid has been commonly used in rotary drilling and with the use of a circulator system has been mainly to "mud-off" formations which do not stand up well, and cave in in such a manner as to "freeze up" the casing. Mud laden fluid has also been successfully used in mudding off gas formations. The mud laden fluid method for shutting off water is comparatively new in California fields and has not been sufficiently demonstrated to receive the wholesale approval of this department. This mud fluid process should be tried only on wells favorable for demonstrating its success or failure, and in general on wells which are not line wells unless agreeable to the neighbors concerned.

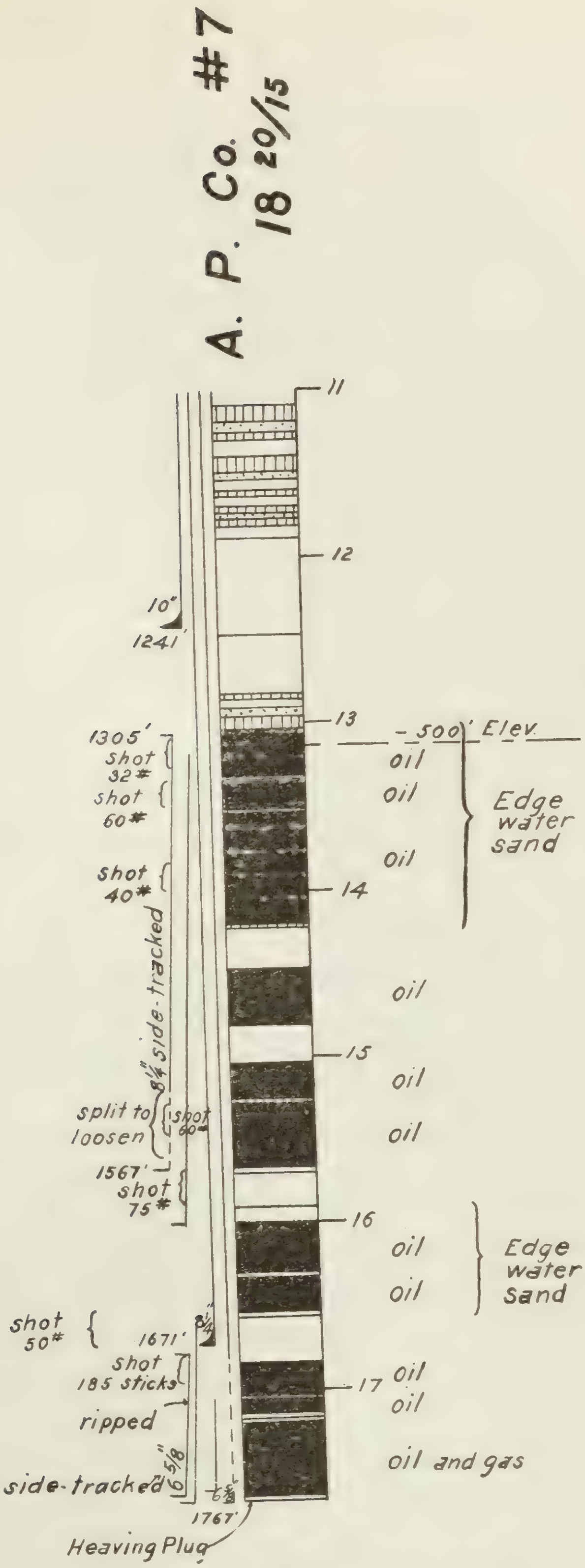
The American Petroleum Company mudded up and cemented well No. 34 on Section 6–20–15 in the Coalinga Field. Water from below the original depth of this well broke in after the well had produced for several years. The well was deepened below the water sand and mud laden fluid pumped in, followed up by 140 sacks of cement. The well was deepened into a lower oil sand and completed in July, 1915, before the present law went into effect. At the present time the well produces about 100 barrels of oil per day with a very small amount of water. The adjoining wells which are still producing from the upper formations show practically no water. The apparent success in confining the water to its own sand in this well is due perhaps to both mud laden fluid and cement combined.

Mud laden fluid was applied in addition to cement in the American Petroleum well No. 7 on Section 18–20–15. The conditions here were more complicated than at their well No. 34 on Section 6. This well penetrated oil producing formations from 1305′ to 1567′ from which the well produced clean oil for five years. The well was deepened to 1767′ during the early part of 1915 and produced heavy oil from the lower formations till near the end of the year when water appeared in the well. Tests made by the company and reported to this department tended to prove that the former sand from 1600′ to 1652′ carried water. Further tests satisfied the company that the upper oil sands from 1305′ to 1420′ also carried water. This means that there is water above and below the oil sands logged from 1448′ to 1566′. By referring to the accompanying sketch (Fig. 21-A) it will be seen that the oil sand from which the well is now producing lies below the (water) sand recorded from 1600′ to 1652′. The sketch shows the position of sidetracked casing and places where the well has been shot.

While redrilling, a thin mud solution was pumped directly into the casing and circulated behind the 8¼″ casing until the solution appeared at the surface. Over 100 cu. yds. of clay was pumped in. The mud solution was started into the hole when redrilling reached a depth of 1550′ and continued for about eight-hour periods during the last eight days preceding the landing of the 8¼″ which was cemented through tubing with 140 sacks of cement.

An official test made by this department showed that water from the upper formations was entirely shut off from the oil formation below the 8¼″ casing. The well was redrilled to its former depth and at the present time is producing about 75 barrels of oil per day and no water. The successful exclusion of water from the lower oil sands is due perhaps largely to the cement used and in some degree, probably to the mud laden fluid introduced.

The work done on this well leaves many questions unanswered as to the probability of adequate protection for the upper oil sands which are the only source of present production for wells in the eastern and southern portion of the field. The two adjoining wells on the property were seriously affected by water before water appeared in the well under discussion. However, a packer has been set in one of the two latter wells and its water condition improved. In addition the well



Well completed, 3-31-'09
Production after 30 days - 30 bbls. per day
15.6° Baume'
Well deepened-Mar.-May, 1915 - From 1567' to 1767

Figure 21 A

under discussion is a line well and under the circumstances a large portion of the burden of proof, that the upper oil sands are protected, falls on neighboring wells. In cases of this kind it is usually claimed that the mud behind the water string prevents the movement of fluid from one stratum to another. It may not be practical to perforate the casing opposite the upper oil sands to prove this, for if this was done, the mud might return into the well. *The work done on this well has not received the entire and final approval of this department.*

In connection with the foregoing discussion of the practice of shutting off water by the mudding process it is evident that this method should be tried in simple cases only, such as top water, until such time as the method has been thoroughly demonstrated. In case this method is applied to wells where a water sand lies between the oil sands, the adjoining wells should be free from water so as to indicate, by their production, the success or failure of the experiment. Wells should be cemented where the mud process is tried in redrilled or old wells where the formation is not suitable for a formation shut off with a long shoe.

In October, 1915, State Supervisor R. P. McLaughlin made an investigation and incidentally a visit to some of the Oklahoma oil fields for the purpose of determining to what extent the process of drilling oil wells with mud laden fluid has there been developed, and whether it is available for use in protecting California oil fields from infiltrating water.

Briefly stated, the mud laden fluid process of drilling oil wells consists of circulating mud along the walls of the drilling well, as is always done when rotary tools are used or when a circulator is used in conjunction with cable tools. The proposed advances in method aim, by using perfectly clean mud under several hundred pounds pressure, to seal off all water, oil or gas bearing sands and carefully leave a solid column of mud behind the casing when it is landed. The theory is that by this method the intermingling of oil and water would be prevented, even though several strata were exposed behind only one string of casing.

The conclusion from this and previous investigations was, that some of the claims advanced as to the usefulness of the process had not been sufficiently demonstrated. The process has for some years been used in this state to prevent the wasting of gas, and the United States Bureau of Mines and the Corporation Commission of Oklahoma are engaged in the very useful work of introducing it among the operators of that state.

Underground conditions in Oklahoma and Kansas are scarcely comparable to those existing here. In those states the formations are so hard that rotary tools were seldom or never used, the wells will frequently stand open with little or no casing and the oil sands are so hard and compact they must be shattered with nitro-glycerine in order to obtain a satisfactory flow of oil. Infiltration of water seems to be of slight importance. Conditions in California are diametrically opposite.

There were, however, some cases observed which at least indicate that mud may serve to shut off water, and brief mention of them will be made. In the Cushing Field there are two productive oil sands, the Laton at a depth of about 1500 feet, and the Bartlesville at a depth of about 2500 feet. At a depth of about 1200 feet is a sand carrying salt water under a hydraulic head of about 1000 feet. The Prairie Oil and Gas Company, a large operator in the field, drills separate wells for the two sands. The deep and shallow wells are frequently less than one hundred feet apart. In the deep wells a single string of casing, backed with mud, penetrates both the upper oil sand and the salt water sand. No ill effects from water are reported in the shallow wells, although the conditions had existed for about six months at some wells.

At Augusta, Kansas, there are sands at a depth of about 1400 to 1500 feet, carrying commercial quantities of gas with rock pressure of about 600 pounds per square inch. At about 2500 feet depth is a productive oil sand. Considerable quantities of water exist above and below the gas. The Wichita Pipe Line Company operates most of the field and drills separate wells, about a quarter of a mile apart, to produce oil and gas. In the deep wells a single string of casing, backed by mud, penetrates both the gas and water sands. No flooding of the gas sand was noted after some three months. The great distance between wells must be noted.

At the townsite of Fowlerton, Texas, two water wells, drilled with rotary tools in 1911, are reported. The first struck fresh water at about 500 feet depth, flowing about 30 gallons per minute over the casing. The second well, about fifty feet distant, was drilled to nearly 1900 feet and between 800 and 1000 feet struck an artesian flow of salt water amounting to about 1200 gallons per minute. Thick mud was circulated back of casing driven at a depth of 1100 feet and while the shallow well was in use, some three or four months, there was no contamination of the water.

The process may reasonably be presumed to accomplish several things greatly to be desired in California, especially a reduction in cost of drilling wells. However, as the State Mining Bureau is engaged in practical work, theory can not be the sole recommendation of this or any other problem. Doubtless some operators will be more than willing to immediately use the mud fluid method of shutting off water as it will be much less expensive than the ordinary methods now in use.

It is recommended that a limited number of wells be permitted to drill with the mud fluid process in selected localities where the after effects can be definitely studied, and if necessary, corrected without undue injury to surrounding property. The work should be allowed to proceed only under definite specifications to be furnished by the State Mining Bureau, which welcomes suggestions as to the specifications.

Specifications for Drilling with Mud.

The following specifications are presented with the understanding that we do not believe them to be incapable of improvement. The Bureau welcomes the introduction of new methods and will gladly confer with any operator on such questions.

(1) The work must at all times be open to the inspection of all operators owning land or operating wells within one mile of the well, and any reasonable information as to the operations must be furnished them.

(2) The mud must be entirely free from sand or grit.

(3) Constant circulation of mud must be maintained during operations until casing is ready to land. Just before the casing is landed the exit of mud from the well must be stopped and pumping continued at a pressure of five hundred pounds per square inch until no more mud can be pumped into the well. After the casing is landed the level of the mud behind it must be kept permanently at the ground surface.

(4) The casing must be landed in some thick bed of sticky clay. Before landing the casing, a hole two inches smaller in diameter than the shoe must be drilled at least three feet below the larger hole.

(5) A casing shoe not less than three feet long must be used. The outside diameter at the point of the shoe must not be larger than at any point above.

(6) Proof will be required that the casing is securely and tightly landed. The well must be drilled at least five feet below the shoe, bailed dry and allowed to stand at least twenty-four hours.

COLLAPSING STRENGTH OF STEEL CASING.

The question of strength of casing to resist collapse is of vital importance to oil operators contemplating deep wells because it must be remembered that after the well is completed it will some times stand nearly empty and therefore the casing will be subject to the maximum pressure of the column of water outside it. Casing which is too light is the poorest kind of false economy.

When a test of the water shutoff is made at a well by the Petroleum Department of the State Mining Bureau, it is desirable to bail the well down as far as is safe, and the accompanying table showing the strength of various sizes and weights of casing is presented as a rough guide. The list is based on a great number of actual tests conducted by Prof.

Reid T. Stewart (Vol. 27, Transactions American Society of Mechanical Engineers), and the figures for depth of water exerting pressure enough to collapse casing is the limit beyond which safe operations would not extend. A prudent operator would stop far short of the limit. It must be remembered that in this list no account is taken of such underground forces as are sometimes reported to have cut off and carried casing to one side and out of reach of the drilling tools. It should be further remembered that when any force is suddenly applied it is much more destructive than when gradually applied, and if a well were suddenly emptied of its fluid content, as in the case of a gas blow-out, the casing might fail under a water pressure that could have been supported if the well were emptied slowly by a bailer or pump. The depth of water is of course sometimes much less than the depth of the well and it is important to always note the level of the fluid which will stand outside of the casing.

Care of casing before it is used is of vital importance. Tests show that when the casing is slightly flattened, or out of round, failure takes place most easily. In handling casing it is frequently allowed to fall and become bruised or dented, thereby inviting collapse when it is later used in a well.

Size of casing (nominal)	Weight per foot, pounds (nominal)	Collapsing strength, pounds per square inch	Depth of water exerting pressure enough to collapse casing (feet)
4¼-inch	16	4,715	10,880
4½-inch	13	2,900	6,700
4½-inch	15	3,605	8,320
5⅝-inch	20	3,295	7,620
6¼-inch	20	2,345	5,420
6¼-inch	24	3,215	7,420
6¼-inch	26	3,650	8,420
6¼-inch	28	4,080	9,420
6⅝-inch	20	1,980	4,570
6⅝-inch	26	3,075	7,080
6⅝-inch	28	3,490	8,060
6⅝-inch	30	3,850	8,900
7⅝-inch	26	1,945	4,480
8¼-inch	28	1,660	3,840
8¼-inch	32	2,150	4,960
8¼-inch	36	2,635	6,080
8¼-inch	38	2,880	6,640
8¼-inch	43	3,510	8,100
9⅝-inch	33	1,285	2,970
10-inch	40	1,425	3,290
10-inch	45	1,795	4,140
10-inch	48	2,025	4,680
10-inch	54	2,510	5,800
11⅝-inch	40	835	1,930
12½-inch	40	500	1,150
12½-inch	45	750	1,730
12½-inch	50	1,010	2,330
12½-inch	54	1,215	2,800
13½-inch	50	650	1,500
15½-inch	70	795	1,840

Table Showing Capacity of Tubing Per Lineal Foot in Gallons and Cubic Feet.

Nominal inside diameter	Weight per foot, pounds	Actual outside diameter, inches	Actual inside diameter, inches	Capacity per foot	
				Gallons	Cubic feet
1¼-inch	2.24	1.660	1.390	.079	.0105
1½-inch	2.68	1.900	1.622	.1078	.0144
2 -inch	4.00	2.375	2.021	.1661	.0222
2 -inch	4.50	2.375	1.971	.1582	.0212
2½-inch	5.74	2.875	2.461	.2470	.0330
2½-inch	6.25	2.875	2.433	.2420	.0323
3 -inch	7.54	3.500	3.080	.3870	.5180
3 -inch	8.50	3.500	3.018	.3720	.0497
3 -inch	10.00	3.500	2.914	.3460	.0463
3½-inch	9.00	4.000	3.558	.5160	.0689
4 -inch	10.66	4.500	4.022	.6600	.0882
4 -inch	11.75	4.500	3.980	.6510	.0870

Table Showing Capacity of Casing Per Lineal Foot in Gallons and Cubic Feet.

4¼-inch	16.00	4.750	4.082	.680	.091
4½-inch	12.85	5.000	4.506	.830	.116
4½-inch	15.00	5.000	4.424	.799	.107
5⅜-inch	20.00	6.000	5.352	1.170	.156
6¼-inch	20.00	6.625	6.049	1.490	.199
6¼-inch	24.00	6.625	5.921	1.430	.191
6¼-inch	26.00	6.625	5.855	1.400	.187
6¼-inch	28.00	6.625	5.791	1.365	.182
6⅝-inch	20.00	7.000	6.456	1.700	.227
6⅝-inch	26.00	7.000	6.276	1.610	.215
6⅝-inch	28.00	7.000	6.214	1.580	.211
6⅝-inch	30.00	7.000	6.154	1.546	.206
7⅝-inch	26.00	8.000	7.386	2.224	.296
8¼-inch	28.00	8.625	8.017	2.625	.350
8¼-inch	32.00	8.625	7.921	2.560	.343
8¼-inch	36.00	8.625	7.825	2.500	.334
8¼-inch	38.00	8.625	7.775	2.470	.330
8¼-inch	43.00	8.625	7.651	2.390	.320
9⅝-inch	33.00	10.000	9.384	3.600	.480
10 -inch	40.00	10.750	10.054	4.130	.552
10 -inch	45.00	10.750	9.960	4.060	.543
10 -inch	48.00	10.750	9.902	4.020	.537
10 -inch	54.00	10.750	9.784	3.900	.522
11⅝-inch	40.00	12.000	11.384	5.290	.706
12½-inch	40.00	13.000	12.438	6.300	.843
12½-inch	45.00	13.000	12.360	6.230	.834
12½-inch	50.00	13.000	12.282	6.140	.821
12½-inch	54.00	13.000	12.220	6.090	.814
13½-inch	50.00	14.000	13.344	7.280	.973
15½-inch	70.00	16.000	15.198	9.420	1.260

FAILURE OF DERRICKS.

Some facts regarding the failure of derricks under storm conditions are furnished in the following notes by Chester Naramore.

The resumption of drilling operations in the fall of 1915, following the long period of suspended work, tended to give the Midway Field the buoyant aspect of the boom days. Coincident with the normal improvement in conditions, the field was visited by two terrific wind storms of January 17th and January 27th, when approximately 1100 derricks were wrecked. With few exceptions the companies started immediately to rebuild the derricks, and for two months the West Side fields furnished work for many rig builders, some of whom came from the midcontinent fields.

The wind storm afforded a splendid opportunity for progressive operators to study the causes of the failure of the derricks. Some of the companies did so, and in rebuilding the derricks made alterations in the method of guying, that there might be less likelihood of the new derricks going down in case of another blow. On the other hand the great majority of the operators merely made a stampede to get the derricks up by contracting with the rig builders to replace the rig as it was, and as soon as possible.

Mr. Fred B. Tough, resident geologist of the Kern Trading and Oil Company, made a detailed study of the failures of derricks belonging to that company, and very kindly delivered a paper on the subject to a number of operators who had gathered to consider the problems. The unanimous sentiment of those gathered was in accord with the decision arrived at by him, to the effect that practically all of the failures were directly or indirectly due to faulty guying.*

Some of the more important causes leading up to failures included:

1. The use of knots in the guy wire, either to splice a short guy wire, or to attach the wire to the deadman.

2. The use of wire tighteners that put a twist in the wire itself, instead of a properly connected turnbuckle.

3. Slack guy wires that allowed the derrick to gain a sway momentum.

4. Shallow deadmen which pulled out. In this regard the boards used as guides on which the deadman is tramped into the hole, should be cut off or pulled out once the deadman is in place, as they also act as skids to work the deadman up out of the earth.

5. Wooden deadmen having rotted, no comment should be necessary, but the practice is still in vogue.

6. Misplacement of guys on the derricks, including the 130-foot ones, in which case the derricks often sheared off at the second or third girts, the first guy wire being too high to resist the shearing stress afforded by the broader portions of the derrick.

It has been noted by this office that the Honolulu Consolidated Oil Company and the Kern Trading and Oil Company have met these dangers by installing proper deadmen equipped with turn buckles that one man can tighten.

One of the aims of this department is to serve the operator by meeting such emergencies and preparing papers on engineering features of the industry. But the necessary time was not available to report on this problem.

GASOLINE PLANTS IN THE MIDWAY FIELD.

Some interesting notes on recent construction and operation of gasoline plants in the Midway Field, as reported by Chester Naramore are here presented.

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*Western Engineering, February, 1917, pp. 63-66.

A very positive method of conservation of natural resources is the manufacture of gasoline from natural gas, commonly termed casing head gasoline, by means of compressor plants. The Midway Field was one of the first fields of the state to be invaded by the gas compressor engineers, when the large Bessemer plant was installed upon Section 10, 32–24 of the Honolulu property in 1911. This plant, however, was never commercially operated. So that in reality it was years after the successful establishment of such plants in the other fields of the state, that the industry was inaugurated in fact in the West Side fields of Kern County.

The first commercial plant was the Midway Gasoline Company installation on Section 2, 32–23. It has been operating about eighteen months.

In November, 1915, the Puritan refineries installed their plant on Section 1, 32–23. Since that date four other plants have been installed and put in operation and two more are being erected.

The Section Sixteen Gasoline Company began operations in April on the Southern California Gas Company lease on the NE. ¼ of NE. ¼ of Section 16, 32–24.

In May, the Fellows Gasoline Company started their compressors on the C. C. M. O. Company property on the W. ½ of SE. ¼ of Section 31–23. Their gathering system serves the wells of the nearby C. C. M. O. leases, the Midway Premier Oil Company and the Hale-McLeod Oil Company.

The Sunset Gasoline Company erected a plant on the St. Helens property, Section 16, 32–24, and started the compressors June 1, 1916.

All the above mentioned plants are operated on gas purchased from the oil companies, and with the exception of the Fellows Gasoline Company, all sell their output to the Union Oil Company for shipment through the oil pipe lines.

The Honolulu Consolidated moved two units of the old Bessemer plant from Section 10, 32–24 to Section 8, 32–24 and installed the plant primarily to raise the pressure on the gas received from the wells on Section 6, 32–24, that it might be delivered into the high-pressure delivery mains of the gas company. A unit of this plant consists of one direct connected gas engine and low stage compressor, and one direct connected gas engine and high stage compressor. The plant as it stands is a complete gasoline compressor plant, in addition to raising the pressure of gas going to the pipe line.

The Standard Oil Company is erecting two compressor plants: one on the McNee lease, Section 36, 31–23, and one on the Derby lease, Section 16, 32–24.

It will be noted that when these two plants are completed, seven of the eight plants of the field will be grouped along the west flank of the Buena Vista hills, within a distance of four miles.

All of the plants are of recent design and embody most of the newer ideas of the industry. Following is a table giving the most salient facts of the equipment of the various installations. Individual production figures can not be published for want of permission; but it may be stated that from the first seven plants of the following list in operation, a daily yield in excess of ten thousand gallons is being recovered. This represents a product formerly lost for all time and represents conservation of the highest type, as well as a very good business investment.

List of Compressor Plants in the Midway Field.

Name of plant	Location of plant	Number of units	Kind of compressors	Kind of engines
Puritan Refineries	Section 1, 32-23. K. T. O. Lease.	Six units. Belt connected.	Six 16 x 8 x 16. Ingersoll Rand. Two-stage.	Six 160-h.p. 4-cylinder "Foos."
Midway Gasoline Co.	Section 2, 32-23. N. American Consolidated.	Six units. Belt connected.	Four 14 x 7 x 14. Two 16 x 8 x 16. Ingersoll Rand. Two-stage.	One 160-h.p. Bessemer. Five 150-h.p. Bessemer.
Section Sixteen Gasoline Co.	Section 16, 32-24. S. California Gas Co.	Three units. Belt connected.	Three 16 x 8 x 16. Ingersoll Rand. Two-stage.	Four 160-h.p. 4-cylinder "Foos."
Fellows Gasoline Co.	Section 31, 31-23. C. C. M. O. Lease.	Three units. Belt connected.	Three 16 x 8 x 16. Ingersoll Rand. Two-stage.	Three 160-h.p. Turner-Frick 4-cylinder.
Sunset Gasoline Co.	Section 16, 32-24. St. Helens Petroleum Co.	Four units. Belt connected.	Four 16 x 8 x 16. Ingersoll Rand. Two-stage.	Four 150-h.p. Bruce Macbeth 4-cylinder.
Honolulu Consolidated Oil Co.	Section 8, 32-24. Honolulu Lease.	Two units. Direct connected.	Four Bessemer. Single stage.	Four 80-h.p. single-cylinder Bessemer, direct connected.
Standard Oil Co.	Section 36, 31-23. McNee Lease.	Four units. Belt connected.	Three single-stage compressors to handle from 90 to 300 lbs. Ingersoll Rand; 8½ x 20; one two-stage Laidlaw Compressor; 21-10-26.	Three 250-h.p. 4-cylinder "Foos" in course of erection. One 20 x 20 Snow engine.
Standard Oil Co.	Section 16, 32-24. Derby Lease.	In course of erection.		Steam driven.

THE EXTRACTION OF GASOLINE FROM NATURAL GAS BY ABSORPTION.

The subject of extracting gasoline from natural gas by the absorption method is worthy of the attention of California operators.

The State Mining Bureau, having been unable to experiment on the subject, is indebted to Mr. Ben E. Lindsly, an engineer with the Honolulu Consolidated Oil Company, for the following brief description.

Introduction.

The absorption method is probably the most recent development for the recovery of gasoline from natural gas. It consists, in its simplest form, of subjecting gas to intimate contact with oil which is completely devoid of gasoline. The gasoline vapors in the gas are deposited in the oil and subsequently recovered from the same by distillation.

The principle is not new, having been applied for a number of years in Germany for the extraction of Benzol and Toluol from coke oven gases. It is also used as a laboratory test for natural gas, and is aptly described in Bulletin No. 88, U. S. Bureau of Mines. Briefly, the test is performed by passing 100 cc of gas from a burette to a pipette containing 35 cc Claroline oil (commercial kerosene will do). The oil and gas are thoroughly mixed, the gas passed back again into the burette, and the diminution in volume is noted as the absorption factor.

This factor will vary according to the richness or leanness of the gas. A so-called "dry" natural gas will usually show an absorption factor of from 15 to 20 per cent, while a very "wet" gas, rich in gasoline vapors will show an absorption of 80 per cent or even more. All natural gases show some absorption even though completely devoid of gasoline vapors, but greater proportions of the heavier hydrocarbons result in greater absorption, as shown by the following table, compiled from Watts Dictionary of Chemistry:

1 Vol. alcohol dissolves	0.532	vol. Methane at 0° C.
1 Vol. alcohol dissolves	1.5	vol. Ethane at 0° C.
1 Vol. alcohol dissolves	6.0	vol. Propane at 0° C.
1 Vol. alcohol dissolves	18.0	vol. Butane at 18° C.

Claroline oil, mineral seal or kerosene will show a similar result, except that these mineral oils show even a greater absorbing capacity than alcohol.

The Commercial Process.

The conditions for application of the commercial process differ in one important respect from the coke oven and the laboratory processes, referred to above, and that is in regard to the pressure under which absorption takes place. In the first instance, the gas is under atmospheric pressure, while in the latter the pressures vary ordinarily from 30 to 300 pounds. These pressures are of great assistance to absorption, a fact not only confirmed by a great many tests, but wholly in accordance with theory.

The operation of a commercial absorption plant can best be described by reference to the accompanying plan (Fig. No. 26), designed by the Hope Natural Gas Company, Pittsburg, Pa.

The plan shows two sets of absorbers in parallel. Gas enters the plant in a 4-inch line, enters vertical spray absorber at side, near bottom, deposits the heavier gasoline vapors and passes from top of spray absorber to horizontal absorber, where it is conducted to bottom of absorber and allowed to bubble through absorbing medium by means of small holes drilled in 4-inch gas line. (See side elevation of horizontal absorber). The gas leaves horizontal absorber practically stripped of its gasoline content, and is ready for commercial distribution under almost the same pressure as when it entered the absorber.

To follow the cycle of absorbing oil, begin at the still. The hot oil leaves still, enters exchanger where it transmits heat to the incoming oil. From exchanger it is pumped through cooler and thence enters horizontal absorber through 4-inch gas line. (See side elevation horizontal absorber.) Oil leaves horizontal absorber at bottom, is pumped to vertical spray absorber, where gas pressure forces it out at bottom to separator where pressure is released. The excess gas given off in separator is transferred by small compressor to the main 4-inch line for distribution to consumers. The oil with its absorbed gasoline goes to heat exchanger thence to still where it is depleted of its gasoline, and ready for another cycle through heat exchanger, cooler, absorbers, etc. The process is continuous, and by the use of float valves, thermostatic controls, and the like, it could probably be made almost automatic.

Distillation is made either by direct radiation from a steam coil within the still, or by running live steam into still allowing it to bubble through the oil and subsequently condensing the gasoline vapors carried off by the steam. Mineral Seal, Headlight, Straw, or certain brands of Diesel engine oil can be used as an absorbing medium. The gravity should be around 34° Baumé, and the boiling point sufficiently high that an easy separation from the absorbed gasoline can be made. An initial boiling point of 450° is satisfactory.

Field Tests.

A convenient field apparatus for making absorption tests is shown in the accompanying figure (No. 24). It consists of an "absorber," a mercury U gauge and a domestic gas meter. About one and one-half gallons of Mineral Seal oil are used in the absorber. Gas enters under line pressure through the first needle valve. The other needle valve and the common valve can be easily adjusted to permit a flow at the rate of one and one-half feet per minute under a pressure of 1″ of

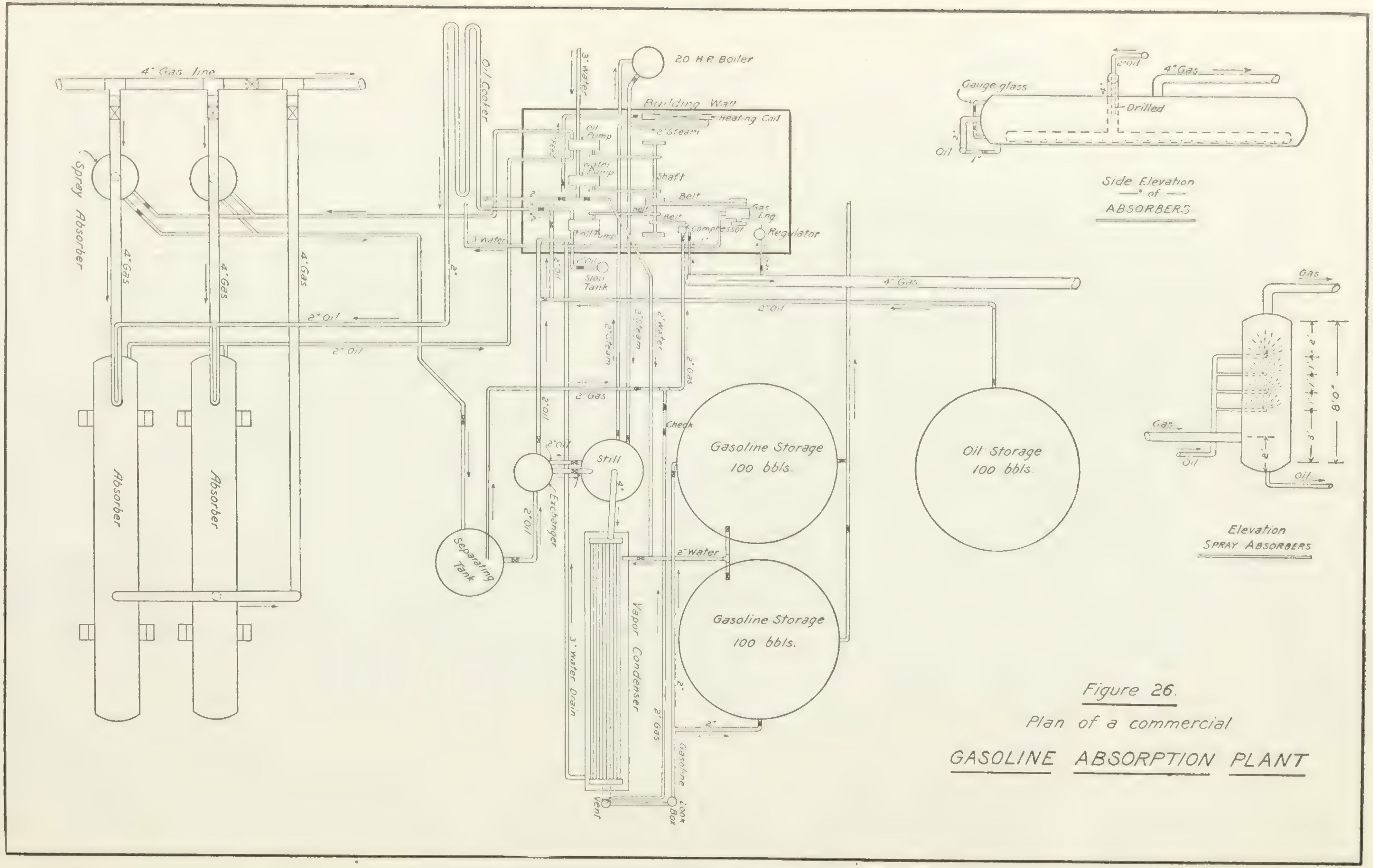


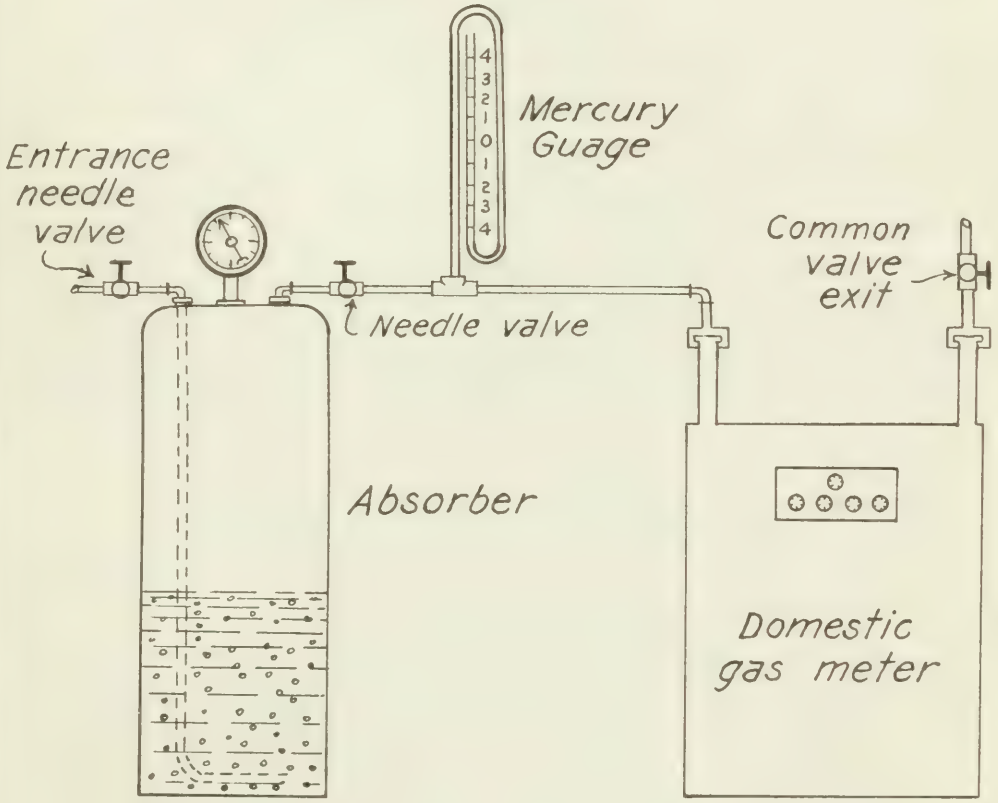
Figure 26.
Plan of a commercial
GASOLINE ABSORPTION PLANT

mercury on the U gauge. One hundred feet of gas is usually sufficient for a test.

At the end of the operation, the oil in the absorber is carefully measured. One liter is taken as a distillation sample and distillation made in small laboratory still by means of live steam. The gasoline vapors driven off are condensed from a small coil cooled preferably by ice water, and the Mineral Seal remains in the still.

When gasoline ceases to come off the operation is completed. The gasoline recovered from 1000 cc of oil is carefully measured and gallons

Figure 24



Apparatus for making gasoline absorption tests in the field.

gasoline per 1000 cu. ft. of gas is computed according to following example:

Gas passed through absorber	100 cu. ft.
Mixture of oil and gasoline taken from absorber	5950 CC
Mixture of oil and gasoline taken for distillation	1000 CC
Amount of gasoline recovered by distillation	25 CC
One (1) U. S. gallon	3785 CC

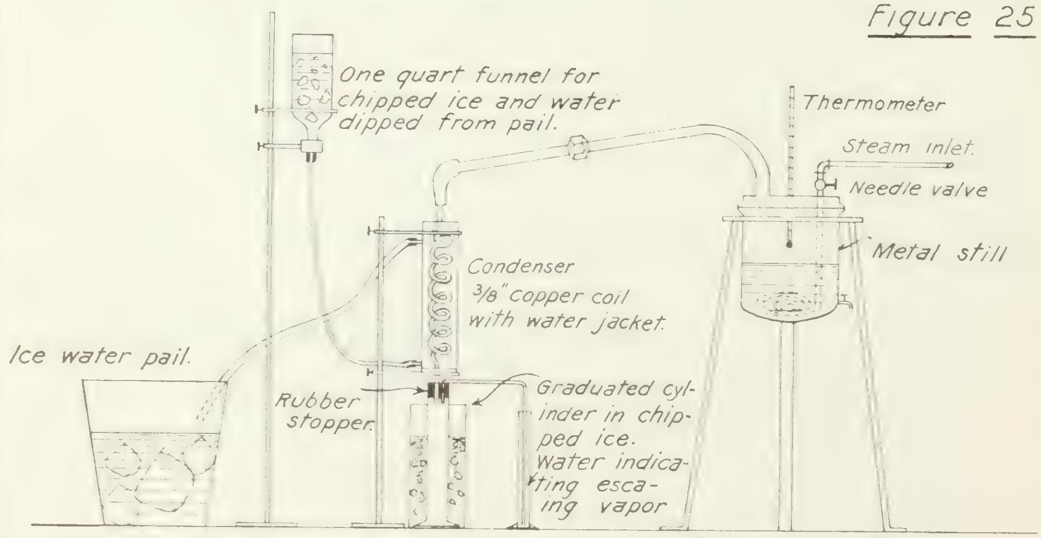
$\frac{5950}{1000} \times 25 = 148.75$ total gasoline in 100 feet gas.

$148.75 \times 10 = 1{,}487.50$ total gasoline in 1,000 feet gas.

$\frac{1487.5}{3785} + \frac{39}{100} =$ gallons gasoline per 1,000 feet gas.

A satisfactory arrangement of still and condenser for carrying on the distillation is shown in Fig. No. 25. It comprises a small metal still about three liters, total capacity, a condenser consisting of a 3.8″ copper coil enclosed in water jacket, a graduated measuring cylinder to catch condensate, which is placed in a larger jar and surrounded by chipped ice. Circulation of cooling water through rubber tubes to jacket of condenser is obvious by means of the funnel on an inverted quart bottle with bottom taken off, which is filled with chipped ice and water poured into it from pail. The tube passing out of the rubber stopper in one cylinder and over to the other graduated cylinder is merely an indicator to show the progress of the first stages of distillation. When the vapor begins to condense and drop into C, the indicator is removed, and the distillation observed by the drops of liquid coming from the condenser.

Figure 25


One quart funnel for chipped ice and water dipped from pail.
Thermometer
Steam inlet.
Needle valve
Metal still
Condenser
3/8" copper coil with water jacket.
Ice water pail.
Rubber stopper.
Graduated cylinder in chipped ice.
Water indicating escaping vapor

Apparatus for distillation test of absorbed gasoline.

The rate of distillation is governed by the needle valve "I" which controls the live steam entering still.

Summary.

The advantages of the absorption over the compressor method for extracting gasoline from natural gas may be summed up as follows:

(1) Greater recovery.
(2) Lower installation cost.
(3) Lower operating cost.

A recovery of at least $\frac{1}{10}$ of a gallon per 1000 feet of gas can ordinarily be made from so called "dry" natural gas or gas which has previously been treated by the compressor method. In a paper read before the Natural Gas Association of America at Pittsburg, May, 1916, Messrs. Burrel, Biddison and Oberfell of the U. S. Bureau of Mines, estimate the cost of an absorption plant, capable of handling 60,000,000 feet of gas per day, at from $1.00 to $1.50 per 1,000 feet of gas. Even doubling the maximum estimate, a small plant capable of handling 2,000,000 feet per day would cost only $6,000.00. With a recovery of $\frac{1}{4}$ of a gallon per 1,000 feet of gas, a total recovery of 500 gallons per day would be made, or a gross income of $50.00 per day, at 10 cents per gallon. The labor expense would not be over $15.00 per day, and as the process is covered by U. S. Patent No. 989927, Serial No. 332988, issued to G. W. Saybolt, April 18, 1911, it is probable that the Hope Natural Gas Company of Pittsburg, Pa., which controls this patent, would claim a royalty of 10 per cent or more, varying with the price of gasoline.

The gravity of the gasoline recovered is usually higher than the commercial product, and therefore requires blending with a lower grade refinery naphtha to fit it for the retail market.

FEDERAL ACTION.

During the past year the activities of the different departments of the federal government relative to withdrawn lands (see Bulletin 623, U. S. Geological Survey), has been a topic of much interest among the oil men of the Midway and Sunset fields, title to a very large acreage hinging upon the outcome of the numerous suits being pressed by the department of justice. The federal court has appointed a receiver to take over the management of the following operating properties in the Midway Field:

Stockton Midway Oil Company.
Part of SE. ¼, Sec. 14, 31–22. Date of appointment, May 1, 1916.

Rock Oil Company.
W. ½ of SE. ¼, Sec. 23, 31–22. Date of appointment, July 27, 1916.

Brookshire Oil Company.
Part of NE. ¼ and SE. ¼, Sec. 24, 31–22. Date of appointment, January 11, 1916.

Coalinga Monterey Oil Company.
Part of NW. ¼ of Sec. 24, 31–22. Date of appointment January 11, 1916.

Midway Pacific Oil Company.
Part of NW. ¼ of Sec. 24, 31–22. Date of appointment, November 30, 1915.

Recovery Oil Company.
Part of SW. ¼, Sec. 24, 31–22. Date of appointment, November 30, 1915.

Pyramid Oil Company.
NW. ¼ of SE. ¼ of Sec. 26, 31–22. Date of appointment, August 11, 1916.

Caribou Oil Mining Company.
Part of SE. ¼, Sec. 28, 31–23.

Consolidated Mutual Oil Company.
Part of NW. ¼ and part of NE. ¼, Sec. 28, 31–23. Date of appointment, February 2, 1916.

Standard Oil Company,
Columbus Midway Lease.
Part of NW. ¼, Sec. 28, 31–23. Date of appointment, December 23, 1915.

California Midway Oil Company.
Part of NE. ¼, Sec. 32, 31–23. Date of appointment, February 2, 1916.

North American Oil Consolidated.
All of Sec. 2, 32–23. Date of appointment February 2, 1916.

General Petroleum Company,
Buena Vista Lease.
Part of SW. ¼, Sec. 32, 31–23. Date of appointment, February 2, 1916.

Boston Pacific Oil Company.
Part of SW. ¼ and part of SE. ¼, Sec. 32, 31–24. Date of appointment, December 15, 1915.

St. Helens Petroleum Company.
Part of SE. ¼, Sec. 32, 31–24. Date of appointment, February 2, 1916.

A receiver has been appointed also for the following nonoperating companies:

Chanslor-Canfield Oil Company.
Part of SW. ¼ and part of NW. ¼, Sec. 25, 31–22. Date of appointment, November 30, 1915.

United Oil Company.
Part of SE. ¼, Sec. 24, 31–22. Date of appointment, January 11, 1916.

Associated Oil Company.
Part of NE. ¼, Sec. 32, 31–23. Date of appointment, February 2, 1916.
Part of SE. ¼, Sec. 26, 30–23. Date of appointment, February 2, 1916.

Record Oil Company.
Part of NW. ¼, Sec. 28, 31–23. Date of appointment, February 2, 1916.

Buick Oil Company.
Part of NE. ¼, Sec. 32, 31–23. Date of appointment, February 2, 1916.

In the Sunset Field the receiver has charge of the following operating properties:

El Dora Oil Company.
Part of SE. ¼, Sec. 32, 12–23. Date of appointment, May 10, 1915.

General Petroleum Company,
Annex Lease.
Part of SW. ¼, Sec. 32, 12–23. Date of appointment, July 12, 1915.

Maricopa Star Oil Company.
Part of SW. ¼, Sec. 32, 12–23. Date of appointment, July 12, 1915.

Midland Oil Fields Company.
Part of SE. ¼, Sec. 32, 12–23. Date of appointment, May 10, 1915.
Part of NE. ¼, Sec. 32, 12–23. Date of appointment, July 12, 1915.

Midway Fields Oil Company.
Part of SW. ¼, Sec. 4, 11–23. Date of appointment, July 12, 1915.

Midway Northern Oil Company.
Part of NW. ¼, Sec. 32, 12–23.

Miocene Oil Company.
Part of SE. ¼, Sec. 32, 12–23. Date of appointment, May 10, 1915.

National Pacific Oil Company.
Part of fractional Sec. 30, 12–23. Date of appointment, May 10, 1915.

Obispo Oil Company.
Part of SW. ¼, Sec. 32, 12–23. Date of appointment, May 10, 1915.

Pacific Midway Oil Company.
Part of SW. ¼, Sec. 32, 12–23. Date of appointment, July 12, 1916.

Spreckels Oil Company.
Part of SW. ¼, Sec. 32, 12–23. Date of appointment, July 12, 1915.

Trojan Oil Company.
Part of SE. ¼, Sec. 32, 12–23. Date of appointment, May 10, 1915.

Union Oil Company,
Jergins Lease.
Part of SW. ¼, Sec. 4, 11–23.

Whitaker, Doan and Laymance.
Part of fractional Sec. 30, 12–23. Date of appointment, May 10, 1915.

The following nonoperating companies in the Sunset Field are also in charge of the receiver:

Union Oil Company,
United Midway Lease.
Part of SW. ¼, Sec. 4, 11–23. Date of appointment, July 12, 1915.

Panama Oil Company.
Part of fractional Sec. 30, 12–23. Date of appointment, May 10, 1915.

California Amalgamated Oil Company.
Part of SE. ¼, Sec. 32, 12–23. Date of appointment May 10, 1915.

National Pacific Oil Company.
Part of SE. ¼ and part of NW. ¼, Sec. 32, 12–23.

Maricopa Northern Oil Company.
Part of NW. ¼, Sec. 32, 12–23. Date of appointment, May 10, 1915.

Various parcels of land in the Midway and Sunset fields have been leased by the federal government to operators who manage the property, market the oil and pay a one-eighth royalty into escrow pending the court decision as to the title of the land in question.

The General Land Office exercises a general supervision over such leases. Field inspectors representing that department make periodical examinations of the property to see that the operators properly protect the holdings in their care from damage of any sort.

A list of the companies and lands operated under this class of federal lease, includes the following:

Bear Creek Oil and Mining Company and Engineers Oil Company.
Involving the SE. ¼ of NE. ¼ and the E. ½, S W.¼, NE. ¼ of Sec. 14, 31–22.

Majestic Oil Company on behalf of the Pinal Dome Oil Company.
Involving the N. ½, NW. ¼ of Sec. 23, 31–22.

Majestic Oil Company, on behalf of the Pinal Dome Oil Company.
Involving the S. ½ of SW. ¼ of Sec. 23, 31–22.

Majestic Oil Company, on behalf of the Tumbador Oil Company.
Involving the S. ½ of NW. ¼ of Sec. 23, 31–22.

Majestic Oil Company, on behalf of the Tumbador Oil Company.
Involving N. ½, SW. ¼, of Sec. 23, 31–22.

Visalia Midway Oil Company.
Involving the S. ½ of SE. ¼ of Sec. 25, 31–22.

Eight Oil Company, on behalf of the Alaska Pioneer Oil Company.
Involving the S. ½ of SE. ¼ of Sec. 32, 31–23.

Eight Oil Company, on behalf of the Pacific Crude Oil Company.
Involving the east 50 acres of the west 60 acres of N. ½ of SE. ¼, Sec. 32, 31–23.

Vancouver Midway Oil Company and Midway Consolidated, Ltd.
Involving the NW. ¼ of NE. ¼ of 25, 31–22.

Charles E. Ladd and St. Lawrence Oil Company and Midway Oil Company of Oregon.
Involving the SE. ¼ of Sec. 5, 32–23.

Monte Cristo Oil and Development Company.
Involving the SW. ¼ of NW. ¼ of Sec. 32, 32–24.

F. V. Gordon and Julius Fried and Le Blanc Oil Company.
Involving S. ½, N. ½, S. ½ of NW. ¼, Sec. 6, 11–23.

The method of controlling the water problems in all oil lands in this state, even though it may eventually be decided that title to some rests with the federal government, should logically be left to the ordinary operation of the state law for the following reasons:

1. The law is so framed as to adequately protect all lands.
2. All oil producers are assessed to support the administrative work established by the state law.
3. The State Mining Bureau has access to all records necessary.
4. Any division of such work will lead to misunderstandings and inefficiency which will be burdensome to the oil operators.

STATISTICS OF PRODUCTION.

The statistics of oil and gas production, together with financial results, for the calendar year, 1915, are fully set forth in Bulletin No. 71 of this Bureau.

Monthly statistics of individual fields are, however, here set forth in order to continue the record published in Bulletin No. 69, which covered all phases of the oil industry and included the monthly field statistics from January, 1903, to October, 1914. The figures are compiled from those published by the Standard Oil Company. Attention is particularly directed to decrease in individual well production shown in nearly all the fields.

KERN RIVER.

	Number of wells		Average daily production in barrels	
	Producing	Completed	Total	Per well
1914—November	1.406		18,235	13.0
December	1,385		17,960	13.0
1915—January	1,373		17,800	13.0
February	1,374	1	17,405	12.7
March	1,397	5	17,655	12.6
April	1,429		18,425	12.9
May	1,584	1	22,575	14.2
June	1,648		24,760	15.0
July	1.671		24,810	14.8
August	1,678		25,282	15.1
September	1,663	1	24,263	14.6
October	1,662		23,902	14.4
November	1,666	1	23,597	14.3
December	1,684	2	23,340	13.9
1916—January	1,683	6	22,810	13.5
February	1,715	4	23,445	13.7
March	1,743	2	24,020	13.8
April	1,759	8	23,315	13.3
May	1,786	14	22,990	12.9
June	1,833	9	23,350	12.7

McKITTRICK FIELD.

1914—November	269		10,481	39.0
December	251	1	9,267	37.0
1915—January	271		10,359	38.2
February	270		10,246	37.9
March	252		9,999	39.6
April	268	2	9,908	37.0
May	278		9,948	35.8
June	277		9,748	35.2
July	278		10,157	36.5
August	277		9,787	35.3
September	279		9,698	34.7
October	276		9,366	33.9
November	275		8,920	32.4
December	276		8,697	31.4
1916—January	276	3	6,112	22.1
February	280	2	7,367	26.3
March	280	1	8,819	31.5
April	280	1	9,119	32.5
May	280	3	9,408	33.6
June	283	2	9,145	32.3

MIDWAY-SUNSET.

	Number of wells		Average daily production in barrels	
	Producing	Completed	Total	Per well
1914—November	1,351	9	116,175	85.9
December	1,376	8	112,376	81.7
1915—January	1,386	7	111,355	80.2
February	1,388	9	109,463	78.8
March	1,316	9	107,630	81.8
April	1,326	7	108,172	81.6
May	1,334	10	106,790	80.0
June	1,388	8	106,490	76.8
July	1,405	19	105,389	75.0
August	1,413	9	107,162	75.9
September	1,377	17	107,889	78.3
October	1,406	10	111,242	79.1
November	1,412	9	106,486	75.3
December	1,418	10	104,691	73.9
1916—January	1,428	11	98,510	69.0
February	1,435	12	98,980	69.0
March	1,483	15	106,653	71.9
April	1,530	17	106,604	69.5
May	1,545	15	107,574	69.5
June	1,557	27	106,643	68.4
LOST HILLS AND BELRIDGE.				
1914—November	238	2	12,601	52.9
December	240	3	12,567	52.1
1915—January	237	1	12,395	52.0
February	241	----------	12,033	49.8
March	238	2	11,623	48.8
April	241	2	12,249	50.8
May	244	3	12,208	50.0
June	248	----------	11,891	47.6
July	247	1	11,766	47.5
August	249	----------	12,043	48.2
September	248	2	11,741	47.1
October	249	1	11,424	45.8
November	249	1	11,179	44.8
December	248	2	11,439	45.9
1916—January	256	6	11,112	43.3
February	261	7	11,853	45.4
March	261	6	12,472	47.5
April	269	10	12,531	46.5
May	278	11	12,553	45.1
June	287	9	12,601	43.9
COALINGA.				
1914—November	826	2	41,262	50.0
December	815	1	39,856	48.9
1915—January	812	2	39,677	48.7
February	807	----------	39,294	48.6
March	817	1	39,704	48.6
April	819	1	38,910	47.5
May	812	1	37,923	46.7
June	803	2	38,955	48.4
July	795	----------	37,297	46.9
August	798	----------	37,341	46.8
September	792	6	34,737	43.8
October	799	----------	34,306	42.9
November	806	----------	34,183	42.4
December	804	1	33,248	41.3
1916—January	803	3	30,911	38.4
February	701	1	26,672	37.9
March	772	3	32,996	42.6
April	812	----------	36,279	44.6
May	853	4	38,394	44.9
June	889	3	42,944	48.2

SANTA MARIA—LOMPOC.

	Number of wells		Average daily production in barrels	
	Producing	Completed	Total	Per well
1914—November	234	1	11,290	47.8
December	235	2	11,105	47.3
1915—January	236	----------	11,065	46.8
February	230	1	11,435	49.6
March	243	----------	11,760	48.2
April	242	----------	12,115	49.9
May	243	2	12,680	52.1
June	242	----------	13,450	55.4
July	241	1	13,365	55.3
August	244	----------	13,600	55.7
September	241	----------	12,545	51.8
October	241	2	12,680	52.5
November	243	----------	11,915	49.0
December	237	----------	12,460	52.3
1916—January	229	3	10,535	45.9
February	237	----------	10,815	45.6
March	237	2	11,405	48.1
April	239	1	11,920	50.2
May	238	1	11,595	48.9
June	238	----------	11,930	50.3

VENTURA-NEWHALL.

	Producing	Completed	Total	Per well
1914—November	438	5	2,632	6.0
December	442	3	2,557	5.8
1915—January	438	4	2,416	5.5
February	430	1	2,545	5.9
March	430	----------	2,525	5.8
April	441	1	2,717	6.1
May	434	2	2,967	6.8
June	439	1	2,824	6.4
July	440	----------	3,018	6.8
August	442	----------	2,741	6.2
September	445	----------	2,924	6.6
October	439	1	2,893	6.6
November	443	1	3,269	7.4
December	444	----------	3,215	7.2
1916—January	444	----------	3,048	6.9
February	444	----------	2,997	6.8
March	441	1	3,277	7.4
April	441	1	3,536	8.0
May	435	1	3,285	7.5
June	435	1	3,194	7.3

SALT LAKE AND LOS ANGELES.

	Producing	Completed	Total	Per well
1914—November	687	----------	6,243	9.1
December	687	----------	6,405	9.2
1915—January	688	----------	5,945	8.6
February	687	----------	6,711	9.8
March	687	----------	5,957	8.6
April	687	----------	6,177	9.0
May	681	----------	5,670	8.3
June	681	----------	5,630	8.3
July	685	----------	5,773	8.4
August	688	----------	5,286	7.7
September	688	----------	5,797	8.4
October	688	----------	5,477	7.9
November	688	----------	5,814	8.4
December	691	----------	5,236	7.6
1916—January	691	----------	4,711	6.8
February	693	----------	5,383	7.8
March	693	----------	4,864	7.0
April	693	----------	4,714	6.8
May	688	----------	4,914	7.1
June	664	----------	4,717	7.1

WHITTIER-FULLERTON.

	Number of wells		Average daily production in barrels	
	Producing	Completed	Total	Per well
1914—November	567	5	40,629	71.8
December	568	8	38,511	67.7
1915—January	568	6	39,293	69.0
February	570	7	37,514	66.8
March	581	6	37,063	63.7
April	589	4	35,807	60.8
May	591	3	35,169	59.4
June	599	3	34,661	57.8
July	600	7	34,714	57.8
August	605	3	34,192	56.4
September	605	4	35,880	59.4
October	611	6	35,023	57.2
November	608	2	35,182	57.8
December	613	5	34,037	55.5
1916—January	620	3	35,385	57.0
February	620	7	35,753	57.6
March	624	4	37,920	60.8
April	627	3	37,849	60.3
May	587	1	38,583	65.6
June	626	6	40,696	64.9
SUMMERLAND.				
1914—November	102		148	1.4
December	102		148	1.4
1915—January	102		148	1.4
February	102		148	1.4
March	102		148	1.4
April	102		148	1.4
May	102		148	1.4
June	102		136	1.3
July	102		137	1.3
August	102		135	1.3
September	95		132	1.4
October	112		153	1.4
November	112		155	1.4
December	112		155	1.4
1916—January	112		155	1.4
February	112		155	1.4
March	112		155	1.4
April	112		155	1.4
May	112		155	1.4
June	112		156	1.4
WATSONVILLE.				
1914—November	5		75	15.0
December	5		75	15.0
1915—January	5		75	15.0
February	5		75	15.0
March	5		75	15.0
April	5		75	15.0
May	4	1	75	18.7
June	5		75	15.0
July	5		75	15.0
August	5		75	15.0
September	5		75	15.0
October	5		75	15.0
November	5		75	15.0
December	5		75	15.0
1916—January	5		75	15.0
February	5		75	15.0
March	5		75	15.0
April	5		75	15.0
May	5		75	15.0
June	5		75	15.0

CALIFORNIA OIL FIELDS.

Month	Wells producing	Wells completed during month	Production		
			Daily	Monthly	Per day per well producing
1903—January	2,307	----------	47,638	1,476,783	20.7
February	2,458	----------	57,520	1,610,572	23.4
March	2,302	----------	58,318	1,807,841	25.3
April	2,349	----------	60,624	1,818,745	25.8
May	2,473	22	73,402	2,275,466	29.7
June	2,523	13	70,750	2,122,522	28.1
July	2,532	20	66,351	2,056,867	26.2
August	2,561	34	71,212	2,207,572	27.8
September	2,587	21	72,841	2,185,230	28.1
October	2,611	25	71,236	2,208,223	27.3
November	2,623	19	74,104	2,223,120	28.3
December	2,608	17	75,531	2,341,540	28.9
1904—January	2,601	19	73,547	2,279,955	28.3
February	2,722	22	74,845	2,170,514	27.5
March	2,722	18	79,541	2,465,785	29.2
April	2,791	25	78,601	2,358,043	28.2
May	2,818	28	79,426	2,462,215	28.2
June	2,885	22	80,332	2,409,988	27.9
July	2,834	24	82,431	2,555,359	29.1
August	2,822	8	82,516	2,557,998	29.2
September	2,755	12	79,629	2,388,876	28.9
October	2,732	18	82,199	2,548,166	30.1
November	2,760	12	86,126	2,583,778	31.2
December	2,713	22	89,289	2,767,957	32.9
1905—January	2,663	12	86,829	2,691,700	32.6
February	2,485	12	89,938	2,518,263	36.2
March	2,266	5	89,033	2,761,009	39.7
April	2,336	17	90,688	2,720,662	38.8
May	2,361	27	94,137	2,918,256	39.9
June	2,376	17	97,733	2,931,982	41.6
July	2,364	27	89,611	2,777,940	37.9
August	2,266	17	90,262	2,798,116	39.8
September	2,327	17	95,934	2,878,049	41.2
October	2,398	12	102,334	3,172,369	42.7
November	2,472	9	102,003	3,060,102	41.3
December	2,456	8	99,019	3,069,593	40.3
1906—January	2,429	13	94,668	2,934,694	38.9
February	2,428	12	97,300	2,726,635	40.1
March	2,372	15	92,506	2,867,693	39.0
April	2,366	24	91,476	2,744,293	38.6
May	2,321	15	91,190	2,826,899	39.3
June	2,335	15	87,169	2,615,085	37.3
July	2,349	14	86,841	2,692,079	36.9
August	2,358	13	84,682	2,625,129	35.9
September	2,397	17	87,037	2,611,097	36.3
October	2,401	16	86,534	2,682,568	36.0
November	2,396	11	88,228	2,646,845	36.8
December	2,426	20	85,491	2,650,212	35.2
1907—January	2,453	14	83,999	2,603,827	34.2
February	2,471	12	89,781	2,513,867	36.3
March	2,511	20	90,012	2,790,385	35.8
April	2,472	22	105,879	3,176,384	42.8
May	2,604	26	117,084	3,629,618	45.0
June	2,678	38	118,499	3,554,986	44.2
July	2,666	30	120,458	3,734,207	45.2
August	2,666	25	114,881	3,561,300	43.1
September	2,696	34	120,268	3,608,046	44.6
October	2,748	37	119,814	3,714,219	43.6
November	2,807	52	116,561	3,496,840	41.5
December	2,827	46	119,962	3,718,833	42.4

CALIFORNIA OIL FIELDS—Continued.

Month	Wells producing	Wells completed during month	Production		
			Daily	Monthly	Per day per well producing
1908—January	2,865	48	121,107	3,754,324	42.3
February	2,914	40	121,761	3,531,061	41.8
March	2,987	38	125,577	3,892,901	42.0
April	3,021	53	125,068	3,752,025	41.4
May	3,051	47	128,889	3,995,562	41.5
June	3,106	59	130,888	3,926,640	42.1
July	3,160	52	129,781	4,023,226	41.1
August	3,219	66	136,094	4,218,916	42.3
September	3,252	48	136,958	4,109,646	42.1
October	3,305	64	139,282	4,317,768	42.1
November	3,351	64	143,367	4,301,011	42.8
December	3,399	62	144,634	4,483,657	42.6
1909—January	3,442	55	145,820	4,520,435	42.3
February	3,433	60	140,679	3,939,026	41.0
March	3,520	57	153,060	4,744,870	43.5
April	3,582	68	159,293	4,778,787	44.5
May	3,640	70	159,088	4,931,729	43.7
June	3,654	67	162,819	4,884,575	44.6
July	3,724	68	163,438	5,066,576	43.9
August	3,775	56	156,001	4,836,017	41.6
September	3,869	59	166,377	4,991,312	43.0
October	3,889	64	166,090	5,148,788	42.7
November	3,945	54	170,441	5,113,236	43.2
December	3,919	70	168,915	5,236,372	43.1
1910—January	3,986	77	167,198	5,183,150	41.9
February	4,045	90	174,133	4,875,711	43.0
March	4,151	88	194,278	6,022,624	46.8
April	4,249	97	219,350	6,580,510	51.6
May	4,293	103	225,672	6,995,825	52.6
June	4,417	102	237,551	7,126,544	53.8
July	4,450	96	232,512	7,207,890	52.2
August	4,509	74	237,688	7,368,320	52.7
September	4,449	72	228,601	6,858,028	51.4
October	4,436	73	211,364	6,552,281	47.6
November	4,556	82	210,773	6,323,189	46.3
December	4,692	65	213,016	6,603,496	45.4
1911—January	4,746	65	211,812	6,566,180	44.6
February	4,757	60	213,329	5,973,206	44.8
March	4,783	68	228,708	7,089,955	47.8
April	4,784	79	230,978	6,929,337	48.2
May	4,870	75	229,467	7,113,466	47.1
June	4,885	55	223,136	6,694,078	45.7
July	4,966	61	223,802	6,937,862	45.1
August	4,997	73	232,546	7,208,934	46.5
September	5,098	79	243,042	7,291,254	47.7
October	5,142	67	234,949	7,283,434	45.7
November	5,143	56	240,343	7,210,297	46.7
December	5,138	62	240,195	7,446,041	46.7
1912—January	5,170	60	246,041	7,627,258	47.6
February	5,157	65	237,705	6,893,432	46.1
March	5,237	58	235,145	7,289,498	44.9
April	5,316	75	240,289	7,208,672	45.2
May	5,374	66	236,554	7,333,180	44.0
June	5,458	67	244,857	7,345,702	44.9
July	5,518	64	243,895	7,560,748	44.2
August	5,556	82	248,208	7,694,442	44.7
September	5,589	56	252,709	7,581,285	45.2
October	5,648	67	263,188	8,158,814	46.6
November	5,627	50	255,873	7,676,176	45.5
December	5,626	59	248,556	7,705,232	44.2

CALIFORNIA OIL FIELDS—Continued.

Month	Wells producing	Wells completed during month	Production		
			Daily	Monthly	Per day per well producing
1913—January	5,638	56	244,592	7,582,346	43.4
February	5,669	57	260,813	7,302,751	46.0
March	5,784	54	264,026	8,184,809	45.7
April	5,847	44	264,795	7,943,851	45.3
May	5,924	42	261,230	8,098,138	44.1
June	5,997	64	270,331	8,109,941	45.1
July	6,035	67	276,578	8,573,906	45.8
August	6,069	49	284,103	8,807,180	46.8

CALIFORNIA OIL FIELDS.

	Number of wells		Daily average production in barrels		Storage in barrels		
	Completed	Producing	Total	Per well	End of month	Decrease	Increase
1913—September	41	6,105	284,076	46.6	47,678,299		
October	39	5,854	263,325	45.0	47,421,993	—256,306	
November	33	5,810	273,265	47.0	47,786,439		+364,446
December	29	5,870	270,353	46.0	47,870,177		+83,738
1914—January	37	5,915	281,835	47.5	49,308,560		
February	36	5,858	280,561	49.9	49,797,205		+488,645
March	33	5,899	286,591	47.7	49,847,770		+50,565
April	33	6,002	284,701	47.3	49,625,570	—222,200	
May	57	6,097	297,466	48.8	50,318,025		+602,455
June	43	6,178	302,400	48.9	521,450,007		+779,820
July	42	6,261	296,296	47.3	52,937,438		+792,431
August	37	6,256	293,943	47.0	53,188,857		+251,419
September	25	6,110	289,979	47.3	55,027,328		+1,838,471
October	28	6,108	282,152	46.2	56,024,899		+997,571
November	24	6,123	259,771	42.3	57,071,088		+1,046,189
December	26	6,106	250,827	41.0	58,526,274		+976,875
1915—January	20	6,116	250,528	41.0	59,276,301		+750,027
February	19	6,104	246,869	40.3	60,527,306		+1,251,005
March	23	6,069	244,139	40.3	60,777,316		+250,010
April	17	6,149	244,703	39.7	60,656,177	—121,139	
May	23	6,307	246,153	39.0	60,820,315		+164,138
June	14	6,432	248,620	38.5	60,616,286	—204,029	
July	28	6,469	246,501	38.2	60,409,979	—206,307	
August	12	6,501	247,644	38.0	60,162,277	—247,702	
September	30	6,438	245,681	38.1	59,624,905	—537,372	
October	20	6,488	246,541	37.1	58,673,592	—951,313	
November	14	6,507	240,775	36.9	57,789,959	—883,633	
December	20	6,532	236,593	36.2	57,147,051	—642,908	
1916—January	35	6,547	223,364	34.1	57,035,887	—111,164	
February	33	6,503	223,495	34.4	56,021,093	—1,014,794	
March	34	6,651	242,651	36.5	54,975,705	—1,045,388	
April	40	6,767	246,097	36.4	53,569,504	—1,406,201	
May	50	6,807	249,526	36.6	52,672,741	—896,763	
June	57	6,929	255,451	36.8	51,199,918	—1,472,823	

	1914	1915
New wells, total	421	220
New wells, average per month	35	20
Producing wells, average number	6,076	6,325
Average daily production per well	46.8	38.8

Figure 22. Record of prices of crude oil at the wells. (Standard Oil Co.)

SAN JOAQUIN FIELD

	DEGREES BAUME'		15			20					25					30	
			Cents per barrel														
1913	Dec.			35			50			55			60		70		75
1914	Jan.		40				"			"			"		"		"
	Feb.		"				"			"			"		"		"
	Mar.		"				"			"			"		"		"
	Apr.		"				"			"			"		"		"
	May		"				"			"			"		"		"
	June		"				45			50			55		65		70
	July	1st. 30th.	"				42½						45		50		60
	Aug.		"				"						"		55		"
	Sep.		"				"						"		"		"
	Oct.	3rd.	37½				40						45				50
	Nov.		"				"						"				"
	Dec.		"				"						"				"
1915	Jan.		"				"						"				"
	Feb.		"				"						"				"
	Mar.		"				"						"				"
	Apr.		"				"						"				"
	May		"				"						"				"
	June	7th.	32½				"						"				"
	July		"				"						"				"
	Aug.		"				"						"				"
	Sep.		"				"						"				"
	Oct.	26th	"				"						"				"
	Nov.	20th	37½				"						"				"
	Dec.	28th	40				45						50				55
1916	Jan.		43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
	Feb.	16th															
	Mar.		53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
	Apr.	1st.															
	May		58	59	60	61	62	63	64	65	67	69	71	73	75	77	79
	June																
	July	7th	63	64	65	66	67	68	69	70	72	74	76	78	80	82	84
	Aug.		"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	Sep.	20th	68	69	70	71	72	73	74	75	77	79	81	83	85	87	89
	DEGREES BAUME'		15			20					25					30	

Figure 23. Record of prices of crude oil at the wells. (Standard Oil Co.)

SOUTHERN FIELDS

<table>
<tr><th></th><th colspan="2">DEGREES BAUME'</th><th></th><th>15</th><th></th><th></th><th></th><th></th><th>20</th><th></th><th></th><th></th><th></th><th>25</th><th></th><th></th><th></th><th></th><th>30</th><th></th><th></th></tr>
<tr><th></th><th colspan="2"></th><th colspan="19">Cents per barrel</th></tr>
<tr><td>1913</td><td>Dec.</td><td></td><td colspan="4"></td><td colspan="4">60</td><td colspan="3">65</td><td colspan="3">75</td><td>85</td><td colspan="4"></td></tr>
<tr><td rowspan="12">1914</td><td>Jan.</td><td></td><td colspan="4"></td><td colspan="4">55</td><td colspan="3">60</td><td colspan="3">70</td><td>80</td><td colspan="4"></td></tr>
<tr><td>Feb.</td><td></td><td colspan="4"></td><td colspan="4">"</td><td colspan="3">"</td><td colspan="3">"</td><td>"</td><td colspan="4"></td></tr>
<tr><td>Mar.</td><td></td><td colspan="4"></td><td colspan="4">"</td><td colspan="3">"</td><td colspan="3">"</td><td>"</td><td colspan="4"></td></tr>
<tr><td>Apr.</td><td></td><td colspan="4"></td><td colspan="4">"</td><td colspan="3">"</td><td colspan="3">"</td><td>"</td><td colspan="4"></td></tr>
<tr><td>May</td><td></td><td colspan="4"></td><td colspan="4">"</td><td colspan="3">"</td><td colspan="3">"</td><td>"</td><td colspan="4"></td></tr>
<tr><td>June</td><td></td><td colspan="4"></td><td colspan="4">50</td><td colspan="3">55</td><td colspan="3">65</td><td>75</td><td colspan="4"></td></tr>
<tr><td>July</td><td>1st
30th</td><td colspan="4"></td><td colspan="3">45</td><td colspan="4">50</td><td colspan="3">60</td><td colspan="5">70</td></tr>
<tr><td>Aug.</td><td></td><td colspan="4"></td><td colspan="3">42½</td><td colspan="4">45</td><td colspan="3">55</td><td colspan="3">65</td><td colspan="2">70</td></tr>
<tr><td>Sep.</td><td></td><td colspan="4"></td><td colspan="3">"</td><td colspan="4">"</td><td colspan="3">"</td><td colspan="3">"</td><td colspan="2">"</td></tr>
<tr><td>Oct.</td><td>3rd</td><td colspan="4"></td><td colspan="3">40</td><td colspan="6">42½</td><td colspan="4">52½</td><td colspan="2">60</td></tr>
<tr><td>Nov</td><td></td><td colspan="4"></td><td colspan="3">"</td><td colspan="6">"</td><td colspan="4">"</td><td colspan="2">"</td></tr>
<tr><td>Dec.</td><td></td><td colspan="4"></td><td colspan="3">"</td><td colspan="6">"</td><td colspan="4">"</td><td colspan="2">"</td></tr>
<tr><td rowspan="12">1915</td><td>Jan.</td><td></td><td colspan="4"></td><td colspan="3">"</td><td colspan="6">"</td><td colspan="4">"</td><td colspan="2">"</td></tr>
<tr><td>Feb.</td><td></td><td colspan="4"></td><td colspan="3">"</td><td colspan="6">"</td><td colspan="4">"</td><td colspan="2">"</td></tr>
<tr><td>Mar.</td><td></td><td colspan="4"></td><td colspan="3">"</td><td colspan="6">"</td><td colspan="4">"</td><td colspan="2">"</td></tr>
<tr><td>Apr.</td><td></td><td colspan="4"></td><td colspan="3">"</td><td colspan="6">"</td><td colspan="4">"</td><td colspan="2">"</td></tr>
<tr><td>May</td><td></td><td colspan="4"></td><td colspan="3">"</td><td colspan="6">"</td><td colspan="4">"</td><td colspan="2">"</td></tr>
<tr><td>June</td><td></td><td colspan="4"></td><td colspan="3">"</td><td colspan="6">"</td><td colspan="4">"</td><td colspan="2">"</td></tr>
<tr><td>July</td><td></td><td colspan="4"></td><td colspan="3">"</td><td colspan="6">"</td><td colspan="4">"</td><td colspan="2">"</td></tr>
<tr><td>Aug.</td><td></td><td colspan="4"></td><td colspan="3">"</td><td colspan="6">"</td><td colspan="4">"</td><td colspan="2">"</td></tr>
<tr><td>Sep.</td><td></td><td colspan="4"></td><td colspan="3">"</td><td colspan="6">"</td><td colspan="4">"</td><td colspan="2">"</td></tr>
<tr><td>Oct.</td><td></td><td colspan="4"></td><td colspan="3">"</td><td colspan="6">"</td><td colspan="4">"</td><td colspan="2">"</td></tr>
<tr><td>Nov.</td><td>20th</td><td colspan="4"></td><td colspan="3">"</td><td colspan="6">"</td><td colspan="4">"</td><td colspan="2">"</td></tr>
<tr><td>Dec.</td><td>28th</td><td colspan="4"></td><td colspan="3">45</td><td colspan="6">47½</td><td colspan="4">57½</td><td colspan="2">62½</td></tr>
<tr><td rowspan="9">1916</td><td>Jan.</td><td></td><td colspan="2"></td><td colspan="2">48</td><td>49</td><td>50</td><td>51</td><td>52</td><td>53</td><td>54</td><td>55</td><td>56</td><td>57</td><td>58</td><td>59</td><td>60</td><td>61</td><td>62</td><td></td></tr>
<tr><td>Feb.</td><td>16th</td><td colspan="2"></td><td colspan="2"></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Mar.</td><td></td><td colspan="2"></td><td colspan="2">53</td><td>54</td><td>55</td><td>56</td><td>57</td><td>58</td><td>59</td><td>60</td><td>61</td><td>62</td><td>63</td><td>64</td><td>65</td><td>66</td><td>67</td><td></td></tr>
<tr><td>Apr.</td><td>1st</td><td colspan="2"></td><td colspan="2"></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>May</td><td></td><td colspan="2"></td><td colspan="2">58</td><td>59</td><td>60</td><td>61</td><td>62</td><td>63</td><td>64</td><td>65</td><td>67</td><td>69</td><td>71</td><td>73</td><td>75</td><td>77</td><td>79</td><td></td></tr>
<tr><td>June</td><td></td><td colspan="2"></td><td colspan="2"></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>July</td><td>7th.</td><td colspan="2"></td><td colspan="2"></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Aug.</td><td></td><td colspan="2"></td><td colspan="2">63</td><td>64</td><td>65</td><td>66</td><td>67</td><td>68</td><td>69</td><td>70</td><td>72</td><td>74</td><td>76</td><td>78</td><td>80</td><td>82</td><td>84</td><td></td></tr>
<tr><td>Sep.</td><td>20th</td><td colspan="2"></td><td colspan="2">68</td><td>69</td><td>70</td><td>71</td><td>72</td><td>73</td><td>74</td><td>75</td><td>77</td><td>79</td><td>81</td><td>83</td><td>85</td><td>87</td><td>89</td><td></td></tr>
<tr><td></td><td colspan="2">DEGREES BAUME'</td><td></td><td>15</td><td></td><td></td><td></td><td></td><td>20</td><td></td><td></td><td></td><td></td><td>25</td><td></td><td></td><td></td><td></td><td>30</td><td></td><td></td></tr>
</table>

DIRECTORY OF OIL COMPANIES.

Showing Date of Incorporation, Amount of Capital Stock, Number of Producing Wells and Counties in which Located.

(Companies in heavy-faced type caps are producing companies.)

A. & J. OIL COMPANY,
400 H. W. Hellman Bldg., Los Angeles, Cal. A. T. Jergins, President, H. J. Haase, Secretary. April 25, 1914. $80,000. Three wells, Kern County, Cal.

Ætna Oil Mining and Developing Company,
112½ Wilmington St., Los Angeles, Cal. W. H. Smith, President, Dwight Harris, Secretary. May 14, 1913. $25,000.

Ætna Petroleum Company,
350 California St., San Francisco, Cal. John Lawson, President, G. S. Tyler, Secretary. April 20, 1899. $50,000.

Aladdin Oil Company,
408 Consolidated Realty Bldg., Los Angeles, Cal. William Mead, President, L. Schenck, Secretary. Sept. 17, 1900. $250,000.

ALASKA PIONEER OIL COMPANY,
433 Mills Bldg., San Francisco, Cal. W. Chappell, President, W. J. Clark, Secretary. March 18, 1910. $500,000. Seven wells, Kern County.

ALBERTA-MIDWAY OIL COMPANY,
Box 441, Bakersfield, Cal. S. G. Tryon, President, A. C. Tupman, Secretary. April 26, 1911. $500,000. Five wells, Kern County.

Alliance Oil Company,
354 Pine St., San Francisco, Cal. L. A. Phillips, President, H. P. Coles, Secretary. July 22, 1909. $3,000,000.

ALMA OIL COMPANY,
403 Mills Bldg. San Francisco, Cal. C. E. Thomas, President, M. A. Thomas, Secretary. June 22. 1900. $400,000. Twenty wells, Kern County.

Alma Oil Company,
Lemoore, Cal. June 23, 1904. $50,000.

Alpha Oil Company,
604 Mills Bldg., San Francisco, Cal. January 30, 1909. $50,000. Kern County.

Altoona Midway Oil Company,
Box 413, Altoona, Pa. R. W. A. Jameson, President, J. H. Fiske, Secretary. February 20, 1909. $500,000. Kern County.

Alvarado Oil Company,
1114 Union Oil Bldg., Los Angeles, Cal. L. H. Mitchell, President, V. C. McCollough, Secretary. February 23, 1904. $300,000.

AMALGAMATED OIL COMPANY,
55 New Montgomery St., San Francisco, Cal. Wm. Sproule, President. P. G. Williams, Secretary. October 27, 1904. $5,000,000. Six wells, Los Angeles County, 17 wells, Orange County.

AMAUROT OIL COMPANY,
507 Foxcroft Bldg., San Francisco, Cal. W. E. Miles, President, A. J. Weston, Secretary. November 9, 1908. $25,000. Four wells, Kern County.

Amazon Oil Company,
410 Citizens Bank Bldg., Pasadena, Cal. A. K. Nash, President, R. H. Pinney, Secretary, Sept. 26, 1900. $400,000. Kern County.

Amber Oil Copmany,
P.O. Box 151, Bakersfield, Cal. John Kincaid, President, S. K. Dickinson, Secretary. July 19, 1909. $500,000. Kern County.

AMERICAN CRUDE OIL COMPANY,
227 Title Insurance Bldg., Los Angeles, Cal. William F. West, President, H. A. Greene, Secretary. January 3, 1912. $500,000. Nine wells, Kern County.

AMERICAN OIL FIELDS COMPANY,
1015 Security Bldg., Los Angeles, Cal. E. L. Doheny, President, Norman Bridge, Secretary. January 10, 1910. $25,000,000. Forty-six wells, Kern County.

AMERICAN PETROLEUM COMPANY,
1015 Security Bldg., Los Angeles, Cal. E. L. Doheny, President, Norman Bridge, Secretary. February 7, 1908. $15,000,000. Eighty-four wells, Fresno County.

AMITY OIL COMPANY,
605 First National Bank Bldg., San Francisco, Cal. Thomas P. Woodward, President, A. B. Smith, Secretary. August 31, 1911. $500,000. Five wells, Fresno County.

AMY OIL COMPANY,
Coalinga, Cal. A. P. May, President, B. L. Wyllie, Secretary. November 14, 1908. $50,000. One well, Fresno County.

Anglo Californian Oil Syndicate, Ltd.,
Lompoc, Cal. W. J. Packard, California Manager. July 17, 1906. £50,000.

ADELINE CONSOLIDATED ROAD OIL COMPANY,
Maricopa, Cal. A. J. Crites. Seven wells, Kern County.

APOLLO OIL COMPANY,
507 Foxcroft Bldg., San Francisco, Cal. W. E. Miles, President, A. J. Weston, Secretary. February 13, 1901. $500,000. Nineteen wells, Kern County.

ARCTURUS OIL COMPANY,
55 New Montgomery St., San Francisco, Cal. Wm. Sproule, President, P. G. Williams, Secretary. February 12, 1904. $400,000. Thirty-one wells, Los Angeles County.

Arequipa Oil Company,
245 Holbrook Bldg., San Francisco, Cal. O. Scribner, President, G. Sheridan. Secretary. January 5, 1909. $500,000. Kern County.

ARICA OIL COMPANY,
245 Holbrook Bldg., San Francisco, Cal. O. Scribner, Vice President, G. Sheridan. Secretary. January 5, 1909. $500,000. Nine wells, Fresno County.

ARIZONA PETROLEUM COMPANY,
2227 Hobart Blvd., Los Angeles, Cal. Julius A. Brown, President, E. W. Forgy, Secretary. March 13, 1910. $250,000. Seven wells, Fresno County.

ASSOCIATED OIL COMPANY,
Sharon Bldg., San Francisco, Cal. Wm. Sproule, President, P. G. Williams, Secretary. October 7, 1901. $40,000,000. 524 wells, Kern County, 47 wells, Fresno County.

Atlas Crude Oil Company,
Care Title Insurance and Trust Company. Los Angeles, Cal. G. M. Giffin, President, Theo. A. Simpson, Secretary. July 14, 1900. $30,000.

August Oil Company,
Box 635, Fresno, Cal. F. A. Homan, President, A. W. Burdick, Secretary. April 4, 1910. $1,000,000. Kern County.

Avenal Land and Oil Company,
350 California St., San Francisco, Cal. John Lawson, President, R. D. Blake, Secretary. April 20, 1899. $500,000.

Azores Oil Company,
Hanford, Cal. M. J. Caetano, President, Wilhelmina Nunes, Secretary. January 20, 1909. $50,000.

Aztec Oil Company,
245 Holbrook Bldg., San Francisco, Cal. August 2, 1909. $250,000.

Baby Kings Oil and Mineral Company,
Box 416, Hanford, Cal. F. B. Skinner, President, W. R. McQuiddy, Secretary. December 8, 1897. $64,000.

Bakersfield-Fresno Oil Company,
Box 688, Fresno, Cal. H. M. Rodgers, President, F. E. Cook, Secretary. August 31, 1899. $100,000. Kern County.

Bakersfield Fuel and Oil Company,
Box 241, Selma, Cal. W. H. Shafer, President, Chas. A. Lee, Secretary. July 31, 1899. $16,000.

Bakersfield Six Oil Company,
Box 246, Bakersfield. Cal. Lesser Hirschfeld, President, L. D. Hirshfeld, Secretary. January 6, 1911. $10,000.

Balboa Oil Company,
629 Spreckels Bldg., San Diego, Cal. A. J. Taylor, President, J. Wiseman, Secretary. June 10, 1912. $500,000.

Bald Eagle Junior Oil Company,
Box 308, Napa, Cal. E. H. Winship, President, J. E. Beard, Secretary. February 1, 1901. $175,000.

Baltimore Oil Company,
Union Oil Bldg., Los Angeles, Cal. June 23, 1910. $1,000,000.

BALD EAGLE OIL COMPANY,
110 Sutter St., San Francisco, Cal. C. H. Phillips, President, Wm. Lange, Jr., Secretary. January 7, 1901. $500,000. Thirteen wells, Kern County.

BANKERS OIL COMPANY,
Citizens Bank Bldg., Los Angeles, Cal. Orra E. Monnette, President, M. J. Monnette, Secretary. November 24, 1909. $1,000,000. Thirty-two wells, Kern County.

BANKLINE OIL COMPANY,
Alaska Commercial Bldg., San Francisco, Cal. John Barneson, President. J. L. Barneson, Secretary. May 20, 1912. $200,000. Seventeen wells, Kern County.

Banner Oil Company,
820 Union Oil Bldg., Los Angeles, Cal. J. H. Strine, President, Ruben S. Schmidt, Secretary. September 12, 1891. $10,000.

Banner Oil Company,
828 Mills Bldg., San Francisco, Cal. J. J. Seymour, President, T. C. Judkins, Secretary. February 19, 1901. $60,000.

BARD OIL AND ASPHALT COMPANY,
816 Storey Bldg., Los Angeles, Cal. Edw. Strasburg, President, E. C. Dunshee, Secretary. August 28, 1900. $2,000,000. Twenty-two wells, Ventura County.

Bardsdale Canon Oil Company,
300 Harvard Blvd., Los Angeles, Cal. Chas. F. Hurd, President, Thos. Pascoe, Secretary. May 16, 1901. $20,000. Ventura County.

BARDSDALE CRUDE OIL COMPANY,
514 Federal Bldg., Los Angeles, Cal. A. F. Schiffman, President, Chas. A. Shaw, Secretary. June 18, 1900. $200,000. Eight wells. Ventura County.

Barnodon Oil Company,
1208 Alaska Commercial Bldg., San Francisco, Cal. John Barneson, President, W. J. Dinsmore, Secretary. April 9, 1910. $1,000,000.

Barstow Paraffin Oil Company,
Barstow, Cal. March 12, 1912. $200,000.

Barstow San Antonio Oil Company,
9 Beach St., Detroit, Mich. January 16, 1915. $100,000.

Bay City Oil Company,
30 S. Raymond St., Pasadena, Cal. Ira J. H. Sykes. Secretary. October 28, 1899. $500,000. Kern County.

Bear Creek Oil Company,
831 State St., Santa Barbara, Cal. J. H. Hurlbut, President, A. R. Edmondson, Secretary. July 12, 1913. $10,000.

BEATTY OIL AND DEVELOPMENT COMPANY,
221 Merchants Trust Bldg., Los Angeles. Cal. S. W. Beatty, President, H. M. Foster, Secretary. February 10, 1913. $1,500,000. One well, Ventura County.

BED ROCK OIL COMPANY,
1114 Union Oil Bldg., Los Angeles, Cal. W. W. Orcutt, President, Giles Kellog, Secretary. January 4, 1909. $50,000. Two wells, Kern County.

Bell Oil Company,
303 Fay Bldg., Los Angeles, Cal. C. E. Lapp, President, J. W. Eberle, Secretary. July 2, 1910. $100,000.

Belmont Oil Company,
Chino, San Bernardino County, Cal. O. J. Newman, President, Edwin Rhodes, Secretary. September 13, 1899. $200,000.

BELRIDGE OIL COMPANY,
1130 Van Nuys Bldg., Los Angeles, Cal. Burton E. Green, President, W. J. Hole, Secretary. January 25, 1911. $1,000,000. Seventy-three wells, Kern County.

Bequette Oil Company,
115 S. Church St., Visalia, Cal. Paschal Bequette, President, N. F. Bradley, Secretary. January 16, 1900. $9,000.

Berkeley Coalinga Oil Company,
129 Leidesdorff St., San Francisco, Cal. W. L. W. Miller, President, D. R. Norris, Secretary. May 12, 1910. $100,000. Fresno County.

Berkeley Paraffine Oil Company,
311 Berkeley National Bank Bldg., Berkeley, Cal. Geo. H. De Kay, President, P. S. Brunk, Secretary. July 16, 1912. $1,000,000.

C. J. BERRY AND F. L. KELLER,
1120 L. A. Investment Bldg., Los Angeles, Cal. C. J. Berry, President, F. L. Keller, Secretary. Fifteen wells, Kern County.

Best Yet Oil Company,
193 E. "E" St., Coalinga, Cal. O. D. Loftus, President, Guy H. Salisbury, Secretary. October 29, 1909. $150,000. Fresno County.

B. H. C. OIL COMPANY,
208 Brower Bldg., Bakersfield, Cal. C. S. Claflin, President, W. H. Hill, Secretary. September 18, 1908. $15,000. Six wells, Kern County.

Big Bill Oil Company,
Fresno, Cal. A. B. Smith, President. April 29, 1909. $200,000.

Big Sespe Oil Company of California,
609 N. Main St., Santa Ana, Cal. L. A. Clampitt, President, Dr. I. D. Mills, Secretary. Sept. 4, 1896. $500,000.

Big Shell Petroleum Company,
10 Farmers National Bank Bldg., Fresno, Cal. H. H. Walsh, Vice President, W. W. Parsons, Secretary. June 7, 1904. $60,000.

BIRCH OIL COMPANY,
R.F.D. No. 4, Fullerton, Cal. Nine wells, Orange County.

Blue Bear Oil Company,
Room 716, 74 New Montgomery St., San Francisco. A. L. Darrow, President. August 15, 1910. $750,000.

Blue Diamond Oil Company,
Grass Valley, Cal. Walter G. Thomas, President, Lloyd P. Larne, Secretary. October 15, 1900. $100,000.

Bohemian Oil Company,
220 N. Irwin St., Hanford, Cal. L. S. Chittenden, President, A. F. Flory, Secretary. July 14, 1909. $500,000.

J. S. BOOK, OIL AND INVESTMENT COMPANY,
521 Washington Bldg., Los Angeles, Cal. J. S. Book, President, G. E. Delavans, Jr., Secretary. February 8, 1913. $50,000. 3 wells, Los Angeles County.

Borst & Baker Oil Company,
Box AA, Coalinga, Cal. Jas. A. Ward, President, A. T. Borst, Secretary. November 19, 1910. $100,000. Kern County.

BOSTON PACIFIC OIL COMPANY,
204 Sharon Bldg., San Francisco, Cal. Fred G. King, President, E. B. Cushman, Secretary. December 12, 1911. $1,000,000. Two wells, Kern County.

BOSTON PETROLEUM COMPANY,
131 State St., Boston, Mass. Arthur Winslow, President, Henry L. Rand, Treasurer. March 21, 1910. $500,000. Eleven wells, Kern County.

Boychester Oil Company,
Box Y, Coalinga, Cal. W. C. Reilly, President, J. A. Fluetsch, Secretary. May 19, 1909. $100,000.

Bradford Oil Company,
1241 Flood Bldg., San Francisco, Cal. H. Nathan, President, Louis Nathan, Secretary. May 17, 1899. $250,000.

BRAD OIL COMPANY, LTD.,
Box 178, Taft, Cal. W. E. Burns, President, E. D. Taylor, Secretary. May 12, 1910. $500,000. Two wells, Kern County.

BREA CANON OIL COMPANY,
1117 Trust and Savings Bldg., Los Angeles, Cal. Dan Murphy, President, G. Holterhoff, Jr., Secretary. July 26, 1899. $200,000. Twenty-four wells, Orange County.

Briceland Oil Company,
Briceland, Cal. J. W. Bourden, President, C. J. Swithenbank, Secretary. April 22, 1913. $150,000.

British American Oil Company,
Box 597, Santa Monica, Cal. W. Z. McDonald, President, Robt. K. Walton, Secretary. August 26, 1907. $100,000.

BRITISH CONSOLIDATED OIL COMPANY,
Coalinga, Cal. R. S. Haseltine, General Manager, E. A. Chatfield, President, 36 Queen St., London, E. C.; E. Palfrey, Secretary, 36 Queen St., London, E. C. August 29, 1908. £2,922,000. 5 wells, Fresno.

Bronco Oil Company,
58 Sutter St., San Francisco, Cal. Chas. A. Son, President, A. N. Baldwin, Secretary. November 19, 1908. $100,000.

BROOKSHIRE OIL COMPANY,
San Luis Obispo, Cal. J. W. Barneberg, President, Henry Bahr, Secretary. December 1, 1902. $500,000. Three wells, Kern County. Three wells, Santa Barbara County.

Brooks Oil Company,
Room 312, 16 California St., San Francisco, Cal. B. F. Brooks, President, C. L. Brooks, Secretary. October 2, 1908. $500,000. Santa Barbara County.

Brown Oil Company,
Bakersfield, Cal. P. S. Brown, President, S. L. Mack, Secretary. January 29, 1900. $250,000.

BUENA FE PETROLEUM COMPANY,
1011 Security Bldg., Los Angeles, Cal. T. A. O'Donnell, President, E. L. Doheny, Jr., Secretary. Fifty-three wells, Kern County.

Buena Vista Oil Company,
522 W. P. Story Bldg., Los Angeles, Cal. J. M. McLeod, President, C. F. Butler, Secretary. July 23, 1914. $1,500,000. Kern County.

BUICK OIL COMPANY, INC.,
729 Title Insurance Bldg., Los Angeles, Cal. D. D. Buick, President. A. B. Allison, Assistant Secretary. March 7, 1910. $5,000,000. One well, Kern County.

Bull Dog Oil Company,
1130 Van Nuys Bldg., Los Angeles, Cal. M. H. Whittier, President, H. L. Westbrook, Secretary. March 6, 1911. $300,000.

Bunker Hill Oil Mining Company,
110 Sutter St., San Francisco, Cal. J. W. Wright, President, Wm. Lange, Secretary. November 9, 1899. $500,000. Kern County.

Calex Oil Company,
Bakersfield, Cal. H. A. Jastro, President. E. St. Clair, Secretary.

CALIFORNIA COAST OIL COMPANY,
1114 Union Oil Bldg., Los Angeles, Cal. W. L. Stewart, President, Giles Kellogg, Secretary. September 10, 1903. $200,000. Ten wells, Santa Barbara County.

CALIFORNIA COUNTIES OIL COMPANY,
58 Sutter St., San Francisco, Cal. J. E. Woodbridge, President, E. A. Richards, Secretary. February 11, 1911. $500,000. Four wells, Kern County.

California Dakota Oil Company,
Temple Bar Building, Fresno, Cal. John Halm, President, Walter Hart, Secretary. October 27, 1913. $200,000.

California Fresno Oil Company,
Box 823, Fresno, Cal. A. C. Ruschhaupt, Secretary. October 31, 1901. $50,000.

CALIFORNIA MIDWAY OIL COMPANY,
401 H. W. Hellman Bldg., Los Angeles, Cal. B. W. McCausland, President, J. H. Nolan, Secretary. January 13, 1912. $1,500,000.

California Natural Gas Company,
200 Bush St., San Francisco, Cal.

CALIFORNIA OIL AND GAS COMPANY,
Coalinga, Cal. W. M. Graham, President. Warren H. Spurge, Secretary. February, 1912. $1,000,000. Three wells, Fresno County.

California Oil Company,
516 Grant Bldg., Los Angeles, Cal. F. J. Rogers, President, J. R. Thomas, Secretary. June 7, 1901. $1,000,000.

California Oil Land Company,
McMahon Audit Company, First National Bank Bldg., Denver, Colo. May 17, 1912. $50,000.

California Reliance Oil Company,
317 Tajo Bldg., Los Angeles, Cal. Thurston Daniels, President, Minnie Daniels, Secretary. April 11, 1910. $1,500,000. Ventura County.

CALIFORNIA STAR OIL COMPANY,
1011 Security Bldg., Los Angeles, Cal. T. A. O'Donnell, President, Ellis T. Yarnell, Secretary. May 20, 1915. $100,000. One well, Kern County.

CALL OIL COMPANY,
1927 Mariposa St., Fresno, Cal. D. A. Ewing, President, W. O. Miles, Secretary. January 8, 1901. $250,000. Three wells, Fresno County.

CALLOMA OIL COMPANY,
1913 Chester Ave., Bakersfield, Cal. H. A. Jastro, President, E. St. Clair, Secretary. February 15, 1904. $200,000. Four wells, Kern County.

CALLOMA EXTENSION OIL COMPANY,
Bakersfield, Cal. H. A. Jastro, President, E. St. Clair, Secretary. Four wells, Kern County.

CALOKLA OIL COMPANY,
540 Title Insurance Bldg., Los Angeles, Cal. P. J. White, President, E. M. Riese, Secretary. Nov. 5, 1903. $250,000. Five wells, Los Angeles County.

CALUMET OIL COMPANY,
636 I. W. Hellman Bldg., Los Angeles, Cal. F. L. Wright, President, Arthur N. Gage, Secretary. April 7, 1911. $1,000,000. 6 wells, Ventura County.

Camarillo Oil Company,
210 W. Seventh St., Los Angeles, Cal. H. J. Doulton, President, L. N. Stott, Secretary. April 22, 1910. $100,000.

Cameron Oil Company of California,
Merchants Trust Bldg., Los Angeles, Cal. John Ferguson, President. H. S. McCallum, Secretary. April 23, 1914. $25,000. Ventura County.

Canadian Coalinga Oil Company, Ltd.
739 Hastings St., West Vancouver, B. C. E. J. McFeely, President, R. J. Cromie, Secretary. October 10, 1910. $1,500,000. Fresno County.

CANADIAN PACIFIC OIL COMPANY,
1003 Central Bldg., Los Angeles, Cal. W. E. Watson, President, M. M. Short, Secretary. March 9, 1907. $2,000,000. Fourteen wells, Los Angeles County.

Canadian Pacific Oil Company of British Columbia, Ltd.,
Box 63, Midland, Cal. September 12, 1910, $3,000,000. Kern County.

Cantin Land, Oil and Development Company,
Star Route, Sanger, Cal. Maude H. Lindsey, President, E. P. Lindsey, Secretary. February 8, 1910. $10,000.

CAPITOL CRUDE OIL COMPANY OF LOS ANGELES,
637 Consolidated Realty Bldg., Los Angeles, Cal. M. H. Sherman, President, A. J. Smith, Secretary. April 26, 1894. $3,000,000. Eleven wells, Ventura County.

CARBO PETROLEUM COMPANY,
Box 34, Bakersfield, Cal. T. M. Young, President, G. R. Peckham, Secretary. July 15, 1909. $500,000. Ten wells, Kern County.

CARIBOU OIL MINING COMPANY,
433 Mills Bldg., San Francisco, Cal. H. H. Hart, President, W. J. Clark, Secretary. June 3, 1899. $100,000. Twenty-three wells, Fresno County. Three wells, Kern County.

Carrec Oil Company,
433 Mills Bldg., San Francisco, Cal. H. H. Hart, President, W. J. Clark, Secretary. September 25, 1914. $100,000.

Carrie May Oil Company,
Visalia, Cal. Seth Smith, President, B. P. Robertson, Secretary. February 28, 1910. $100,000.

Carrie Nation Oil Company,
Lemoore, Cal. L. Y. Trout, President, Frank B. Graves, Secretary. December 23, 1908. $25,000.

Case Mineral and Petroleum Company,
955 Winfield Lee Apt., Los Angeles, Cal. A. E. Case, President, R. M. McAlwy, Secretary. August 26, 1914. $500,000.

Casmalia Syndicate,
Realty Syndicate Bldg., Oakland, Cal. L. E. Doan, Manager. Santa Barbara County.

Castle Oil Company,
1012 Balboa Bldg., San Francisco, Cal. H. A. Whiteley, President, B. H. Henderson, Secretary. March 19, 1910. $600,000.

Cavedale Oil and Development Company,
1332 Evans Ave., San Francisco, Cal. S. Peisle, President, H. Saxe, Secretary. December 8, 1914. $200,000.

C. C. Harris Oil Company,
701 College St., Los Angeles, Cal. Mary B. Cates, President, E. R. Snyder, Secretary. February 10, 1909. $500,000.

Central California Oil Company,
1114 Union Oil Bldg., Los Angeles, Cal. W. S. Stewart, acting President. May 28, 1886. $200,000.

CENTRAL OIL COMPANY,
404 H. W. Hellman Bldg, Los Angeles, Cal. D. A. Lothian, President, Robert N. Bulla, Secretary. January 2, 1900. $3,000,000. Fifty-five wells, Los Angeles County.

CHANSLOR-CANFIELD MIDWAY OIL COMPANY,
206 Kerckhoff Bldg., Los Angeles, Cal. E. P. Ripley, President, G. Holterhoff, Jr., Secretary. August 15, 1901. $5,000,000. One hundred and six wells, Kern County.

CHENEY STIMSON OIL COMPANY,
806 Merchants National Bank Bldg., Los Angeles. A. L. Cheney, President, E. T. Stimson, Secretary. December 17, 1909. $100,000. Six wells, Kern County.

Cherokee Development Company,
Box 388, Fresno, Cal. C. W. Purrington, President, J. H. Bingham, Secretary. December 9, 1909. $100,000. Kern County.

Chino Oil Company,
111 W. Fourth St., Los Angeles, Cal. E. J. Marshall, President, John F. Horton, Secretary. October 18, 1907. $50,000.

C. H. Oil Company,
433 Mills Bldg., San Francisco, Cal. William Chappell, President, W. J. Clark, Secretary. December 5, 1911. $100,000.

Circle Oil Company,
501 Balboa Bldg., San Francisco, Cal. T. A. O'Donnell, President, O. G. Myers, Secretary. April 10, 1908. $100,000. Fresno County.

Clam Shell Oil Company,
Selma, Cal. L. A. Rockwell, President, W. B. Good, Secretary. October 12, 1899. $25,000.

E. A. AND D. L. CLAMPITT,
959 E. Fourth St., Los Angeles, Cal. Nine wells, Los Angeles County.

CLAREMONT OIL COMPANY,
1114 Union Oil Bldg., Los Angeles, Cal. Wm. L. Stewart, President, R. B. Wallace, Secretary. January 25, 1901. $500,000. Seven wells, Fresno County. Fourteen wells, Kern County.

Climax Oil Company,
512 First National Bank Bldg., San Jose, Cal. S. F. Leib, President. April 23, 1900.

Coalinga Central Oil Company,
1913 Chester Ave., Bakersfield, Cal. April 9, 1910. $600,000.

Coalinga Crown Oil Company,
2039 Mariposa St., Fresno, Cal. J. C. Pottle, President, A. M. Drew, Secretary. September 17, 1909. $300,000.

COALINGA EIGHT OIL COMPANY,
Coalinga, Cal. W. S. Boggs, President, H. Steinbach, Secretary. April 4, 1910. $600,000. Three wells, Fresno County.

Coalinga Empire Oil Company,
709 New Call Bldg., San Francisco, Cal. H. A. Whitley, President, F. T. Mardens, Secretary. October 28, 1914. $1,000,000. Fresno County.

Coalinga Four Oil Company,
Box 207, Coalinga, Cal. T. A. O'Donnell, President. R. L. Peeler, Secretary. May 8, 1907. $50,000.

COALINGA HOMESTAKE OIL COMPANY,
Box 463, Coalinga, Cal. A. P. May, President. July 29, 1909. $100,000. Four wells, Fresno County.

Coalinga Hub Oil Company,
Box 463, Coalinga, Cal. Geo. Awalt, President, Geo. E. H. Satchett, Secretary. October 24, 1908. $250,000.

Coalinga Lost Hills Oil Company,
Box 207, Coalinga, Cal. R. C. Baker, President, R. L. Peeler, Secretary. January 4, 1911. $50,000.

Coalinga Metropolis Oil Company,
611 Balboa Bldg., San Francisco, Cal. G. H. Umbsen, President, E. Tourtellot, Secretary. October 2, 1909. $100,000.

COALINGA MOHAWK OIL COMPANY,
381 Bush St., San Francisco, Cal. J. H. Spring, President, W. M. Pherson, Secretary. April 15, 1907. $500,000. Two wells, Fresno County.

COALINGA MONTEREY OIL COMPANY,
201 Main St., Salinas, Cal. E. A. Nickerson, President, L. Rodgers, Secretary. March 17, 1910. $2,000,000. One well, Kern County.

Coalinga National Petroleum Company,
310 Sansome St., San Francisco, Cal. John Barneson, President, V. M. Shaw, Secretary. May 8, 1909. $500,000. Fresno County.

COALINGA NORTH POLE OIL COMPANY,
Box 692, Fresno, Cal. W. B. Holland, President, L. W. Wilson, Secretary. October 2, 1909. $50,000. One well, Fresno County.

COALINGA OIL COMPANY,
509 Wells Fargo Bldg., San Francisco, Cal. J. A. Chanslor, President, R. O'Kane, Secretary. March 18, 1897. $100,000. Four wells, Fresno County.

Coalinga Oil Fields Company,
Insurance Exchange Bldg., San Francisco, Cal. A. E. Boynton, Secretary. April 10, 1911. $1,000,000.

COALINGA PACIFIC OIL AND GAS COMPANY,
109 W. Eighth St., Hanford, Cal. J. O. Hickman, President, G. J. Bliss, Secretary. August 4, 1903. $165,00. 2 wells, Fresno.

COALINGA PEERLESS OIL COMPANY,
824 Crocker Bldg., San Francisco, Cal. H. C. Park, Secretary. November 14, 1904. $1,000,000. Thirteen wells, Fresno County.

COALINGA PETROLEUM COMPANY,
Coalinga, Cal. S. W. Morshead, President, A. A. Baker, Secretary. January 23, 1905. $75,000. Five wells, Fresno County.

Coalinga Security Oil Company,
919 Investment Bldg., Los Angeles, Cal. F. E. Woodruff, President, C. H. McWilliams, Secretary. February 25, 1910. $300,000. Fresno county.

COALINGA SYNDICATE OIL COMPANY,
Insurance Exchange Bldg., San Francisco, Cal. R. K. Barrows, President. A. E. Boynton, Secretary. June 28, 1911. $2,500,000. Two wells, Fresno County.

Coalinga Unity Oil Company,
Box 463, Coalinga Cal. G. A. Scott, President, G. E. H. Satchell, Secretary. September 24, 1909. $200,000. Fresno County.

Coal Oil Company,
Box 785, Fresno, Cal. Jacob Clark, Secretary. January 28, 1904. $200,000.

Coast Range Oil Company,
701 Washington Bldg., Los Angeles, Cal. Mary B. Cates, President, A. M. Cates, Secretary. May 10, 1890. $10,000. Fresno County.

Colonia Oil Company of Oxnard,
Box A, Oxnard, Cal. A. Levy, President, H. W. Witman, Secretary, September 13, 1909. $200,000.

COLORADO OIL COMPANY,
Merchants National Bank Bldg., San Diego, Cal. Ralph Granger, President, J. E. Hasbrouck, Secretary. December 22, 1909. $200,000. Fourteen wells, Los Angeles County.

Colorado Pacific Development Company,
870 Market St., San Francisco, Cal. J. H. Hunt, President, L. A. Maison, Secretary. December 5, 1907. $1,000,000.

COLUMBIA OIL PRODUCING COMPANY,
303 Tajo Bldg., Los Angeles Cal. W. B. Scott, President, W. Astley, Secretary. May 28, 1900. $3,500,00. Forty-nine wells, Los Angeles County. Fifty-nine wells, Orange County.

Combination Midway Oil Company,
301 Story Bldg., Los Angeles, Cal. D. W. Wickersham, President, M. S. Robertson, Secretary.

THE COMBINED OIL COMPANY,
849 Phelan Bldg., San Francisco, Cal. Philip C. Boardman, President, Geo. J. Hansen, Secretary. May 29, 1911. $2,500,000. Eight wells, Kern County.

COMMERCIAL PETROLEUM COMPANY,
268 Market St., San Francisco, Cal. Wm. Matson, President, Harry B. Gregg, Secretary. July 27, 1896. $250,000. Ten wells, Fresno County.

Comstock Crude Oil Company,
421 Kerckhoff Bldg., Los Angeles, Cal. L. U. Comstock, President, N. J. Hudson, Secretary. November 2, 1912. $500,000.

Concord Petroleum Company,
170 Broadway, New York, N. Y. October 5, 1910. $1,000,000.

CONFIDENCE OIL COMPANY,
Box 1123, Fresno, Cal. D. E. Ewing, President, I. J. Vincent, Secretary. May 13, 1899. $48,000. Nine wells, Fresno County.

Conservative Development Company,
319 Wilcox Bldg., Los Angeles, Cal. L. W. Myers, President. E. C. Price, Secretary. February 27, 1903. $20,000.

CONSERVATIVE OIL COMPANY,
Maricopa, Cal. C. Brubacher, President, E. L. Weed, Secretary. March 1, 1905. $62,500. One well, Kern County.

CONSOLIDATED MUTUAL OIL COMPANY,
901 Balboa Bldg., San Francisco, Cal. Louis Titus, President, Geo. F. Hatton, Secretary. February 16. 1914. $3,000,000. Fifteen wells, Kern County.

Consolidated Oil and Development Company.
637 Monadnock Bldg., San Francisco, Cal. Wm. C. Edes, President, J. C. Cullen, Secretary. August 14, 1896. $50,000.

CONSOLIDATED OIL LANDS COMPANY,
Insurance Exchange Bldg., San Francisco, Cal. Chas. W. Gardner, President, A. E. Boynton, Secretary. April 27, 1911. $5,000,000. Two wells. Fresno County.

CONTINENTAL OIL AND MINING COMPANY,
322 Russ Bldg., San Francisco, Cal. M. Spiegleman, President, Geo. W. Forsyth, Secretary. July 14, 1914. $100,000. One well, Santa Clara County.

Continental Oil Company of Los Angeles,
227 Security Bldg., Los Angeles, Cal. A. D. Elwell. President, C. E. Price, Secretary. December 16, 1899. $300,000. Kern County.

Copa De Oro Petroleum Company,
512 California Bldg., Los Angeles, Cal. G. M. Lane, President, W. A. Butterworth, Secretary. December 12, 1914. $450,000.

Copeck Oil Company,
310 Sansome St., San Francisco, Cal. John Barneson, President, W. J. Dinsmore, Secretary. July 8, 1909. $500,000.

Cosmo Oil Company,
Box 267, Hanford, Cal. W. K. Knapp, President, F. B. Cunningham, Secretary. April 29, 1909. $100,000.

COSMOPOLITAN OIL COMPANY,
510 Douglas Bldg., Los Angeles, Cal. G. L. Holton, President, Robert G. Holton, Secretary. May 1, 1912. $400,000. Three wells, Ventura County.

Crafton Oil Company,
26 W. State St., Redlands, Cal. J. R. Baird, Jr., President, A. R. Schultz, Secretary. February 17, 1911. $25,000.

Cree Oil Company,
1130 Van Nuys Bldg., Los Angeles, Cal. Burton E. Green, President, Chas. B. Anderson, Secretary. June 1, 1903. $1,000.000.

Creme Petroleum Company,
625 Market St., San Francisco, Cal. April 25, 1910. $600,000.

CRESCEUS OIL COMPANY,
577 I. W. Hellman Bldg., Los Angeles, Cal. J. L. Scott, President, W. M. Wallace, Secretary. March 7, 1907. $320,000. Nine wells, Kern County.

Crown of the Valley Oil Company,
Box 613, Pasadena, Cal. C. J. Willett, President, R. D. Badger, Secretary. March 2, 1900. $300,000. Orange County.

Crow Oil Company,
2726 Hilligas Ave., Berkeley, Cal. C. C. Crow, President, R. B. Marshall, Secretary. April 25, 1900. $400,000.

Cubbon Oil Company,
Santa Ana, Cal. John Cubbon, President, J. G. Quick, Secretary. September 24, 1900. $200,000.

DABNEY OIL COMPANY,
1215 Hollingsworth Bldg., Los Angeles, Cal. Ira D. McCoy, President, John S. Mitchell, Secretary. May 31, 1901. $1,000,000. One well, Kern County.

JOSEPH B. DABNEY & COMPANY,
911 Baker-Detwiler Bldg., Los Angeles, Cal. Sixteen wells, Kern County.

Dayton Oil Company of Ohio,
371 W. First St., Dayton, Ohio. Geo. M. Smart, President, G. Frank Kuhns, Secretary, October 15, 1908. $200,000. Kern County.

DEL REY OIL COMPANY,
6 Union Savings Bank Bldg., Pasadena, Cal. Alex Miller, President, John C. Dalton, Secretary. December 19, 1900. $1,000,000. Twelve wells, Kern County.

Del Sable Oil Company,
1241 Flood Bldg., San Francisco, Cal. Louis Getz, President, Louis Nathan, Secretary. November 24, 1890. $250,000.

De Luxe Oil Company,
Box 867, Fresno, Cal. Geo. Kaehler, President, A. W. Burdick, Secretary. December 2, 1908. $100,000.

DEVILS DEN CONSOLIDATED OIL COMPANY,
510 Crocker Bldg., San Francisco, Cal. Geo. T. Cameron, President, R. A. Morton, Secretary. February 2, 1900. $103,000. Twelve wells, Kern County.

Devils Den Oil Company,
121 Main St., Visalia, Cal. November 11, 1899. $34,000.

Diamond Oil Company,
301 Bradbury Bldg., Los Angeles, Cal. E. R. Kellum, President, E. H. Miller, Secretary. January 17, 1916. $25,000.

Diamond Tip Oil Company,
Reedley, Cal. J. A. Gallahar, President, Henry F. Urnnes, Secretary. March 26, 1910. $12,000.

DIAMOND VALLEY OIL COMPANY,
815 Los Angeles Investment Bldg., Los Angeles, Cal. Chas. M. Hoff, President, Melvin Bartlett, Secretary. February 3, 1911. $1,000,000. One well, Ventura County.

Directors Oil Company,
401 Union Oil Bldg., Los Angeles, Cal. E. R. Snyder, President. March 9, 1899. $12,000.

Dixie Oil Company,
121 E. Main St., Visalia, Cal. A. Levis, President, A. D. Sweet, Secretary. February 3, 1900. $100,000.

DOAN WHITAKER AND LAYMANCE,
Realty Syndicate Bldg., Oakland, Cal. One well, Kern County.

D. J. OIL COMPANY,
Jacobs Bldg., Visalia, Cal. B. B. Dudley, President, Daniel McFadzean, Secretary. June 13. 1912. $40,000. One well, Kern County.

D. M. W. COMPANY,
Box 38, Santa Paula, Cal. J. F. Dickson (owner). Twelve wells, Ventura County.

Dominion Oil Company,
508 Postal Telegraph Bldg., San Francisco, Cal. N. M. Crossett, Secretary. January 20, 1910. $250,000.

Dorsby Oil Company,
418 Title Insurance Bldg., Los Angeles, Cal. E. A. Doran, President, R. Tudor, Secretary. April 11, 1912. $100,000.

Dudley Oil Company,
261 California St., San Francisco, Cal. Philip Kiefer, Secretary. W. Kahn, Secretary. October 3, 1907. $10,000.

B. B. AND E. R. DUDLEY PETROLEUM COMPANY,
NE. Twelfth and Franklin Sts., Oakland, Cal. E. R. Dudley, President, E. R. Arner, Secretary. March 11, 1914. $2,000,000. Five wells, Kern County.

Dunlop Oil Company,
1002 Crocker Bldg., San Francisco, Cal. C. H. Holbrook, Jr., President. November 26, 1909. $200,000.

DUQUESNE OIL COMPANY,
124 W. Fourth St., Los Angeles, Cal. T. D. Wood, President, R. H. Herron, Vice President and Manager. Nine wells. Santa Barbara County.

EAGLE CREEK,
Fellows, Cal. T. N. Scofield, President, W. H. Cooley, Secretary. January 7, 1910. $1,000,000. Eight wells, Kern County.

Eaglet Oil Company,
Room 255, 58 Sutter St., San Francisco, Cal. J. A. Weston, President, S. G. O. King, Secretary. February 27, 1901. $50,000. Kern County.

East Oakland Oil Company,
78 Bacon Bldg., Oakland, Cal. J. J. Enos, President, W. A. Bell, Secretary. August 28, 1908. $10,000.

EAST PUENTE OIL COMPANY,
Box 281, San Diego, Cal. Geo. R. Harrison, President, R. E. Miner, Secretary. March 25, 1901. $500,000. Twenty-one wells, Kern County.

East San Emidio Oil Land Company,
347 Title Insurance Bldg., Los Angeles, Cal. Chas. A. Cale, President, W. S. McGiffert, Secretary. April 20, 1911. $500,000.

East Whittier Oil Company,
404 H. W. Hellman Bldg., Los Angeles, Cal. W. W. Neuer, President, Robt. N. Bulla, Secretary. May 21, 1900. $250,000.

E. D. Burge Oil Company,
Bakersfield, Cal. E. D. Burge, President, C. H. Traney, Secretary. December 11, 1914. $50,000.

EDMONDS MIDWAY OIL COMPANY,
406 Wilcox Bldg., Los Angeles, Cal. A. B. Barret, President, C. S. Stuart, Secretary. May 27, 1910. $1,500,000. Two wells, Kern County.

Eight Oil Company,
Box OO, Bakersfield, Cal. S. P. Wible, President, T. E. Klipstein, Secretary. March 22, 1909. $50,000.

Elaine Oil Company,
165 E. E St., Coalinga, Cal. A. E. Webb, President, R. S. Peeler, Secretary. $300,000.

El Camino Oil and Development Company,
228 First National Bank Bldg., Oakland, Cal. W. V. Harrington, President, A. W. Beam, Secretary. October 26, 1910. $600,000. Kern County.

El Dee Oil Company,
1241 Flood Bldg., San Francisco, Cal. September 15, 1908. $500,000.

Eldorado Oil Company,
1201 Federal Realty Bldg., Oakland, Cal. W. J. Berry, President, E. E. Bush, Secretary. March 4, 1899. $100,000. Kern County.

Electra Oil Company,
1241 Flood Bldg., San Francisco, Cal. Louis Nathan, Secretary. November 20, 1908. $500,000.

ELIM OIL COMPANY,
1110 Union Oil Bldg., Los Angeles, Cal. J. P. Weller, President, L. M. Crowell, Secretary. September 12, 1912. $500,000. One well, Ventura County.

ELK HORN OIL COMPANY,
Box 8, Taft, Cal. R. E. Graham, President, G. G. Patton, Secretary. March 13, 1908. $2,000,000. Three wells, Kern County.

Elk Ridge Oil Company,
903 Grattan St., Los Angeles, Cal. F. J. Carmen, President, E. Carman, Secretary. March 17, 1910. $10,000.

ELLIOTT OIL COMPANY,
1208 Alaska Commercial Bldg., San Francisco, Cal. J. L. Barneson, Secretary. Four wells, Kern County.

EMPIRE GAS AND FUEL COMPANY,
605 Ferguson Bldg., Los Angeles, Cal. R. A. Broomfield, President, W. C. Cushing, Secretary. October 9, 1912. $100,000. One well, Kern County.

EMPIRE OIL COMPANY,
1118 Hearst Bldg., San Francisco, Cal. H. A. Whitley, President, B. H. Henderson, Secretary. February 4, 1909. $200,000. Five wells, Ventura County.

Encinal Oil Company,
414 Marsh-Strong Bldg., Los Angeles, Cal. Wm. J. Nimmo, Secretary. May 2, 1907. $1,000,000.

ENGINEERS OIL COMPANY,
521 Consolidated Realty Bldg., Los Angeles, Cal. F. C. Kingsbury, President, C. M. Dull, Secretary. March 28, 1911. $220,000. Five wells, Kern County.

Enos Oil Company,
278 Russ Bldg., San Francisco, Cal. John Baker, Jr., President, I. Sutcliffe, Secretary. May 1, 1909. $500,000.

Ensign Oil Company,
284 Perry St., San Francisco, Cal. E. J. Ensign, President, L. E. Ensign, Secretary. May 13, 1914. $100,000.

Enterprise Land and Oil Company,
58 Sutter St., San Francisco, Cal. T. Goldman, Secretary. November 7, 1899. $200,000.

ETHEL D COMPANY,
Rooms 1 to 4, Union National Bank Bldg., Fresno, Cal. Clarence J. Berry, President, M. J. Laymance, Secretary. September 13, 1909. $1,000,000. Nineteen wells, Kern County.

Etzenhauser Oil Company,
204 E. Main St., Visalia, Cal. L. Lucier, President, J. Sub Johnson, Secretary. October 13, 1909. $75,000.

EUCLID OIL COMPANY,
622 Union Oil Bldg., Los Angeles, Cal. M. V. McQuigg, President, A. J. Wallace, Secretary. August 8, 1900. $350,000. Six wells, Kern County.

Eureka Crude Oil Company,
959 E. Fourth St., Los Angeles, Cal. E. A. Clampitt, President, H. A. Greene, Secretary. January 28, 1902. $200,000. Los Angeles County.

Exploration Oil Company,
Room 507, 201 Sansome St., San Francisco, Cal. Dorsey Ash, President, Walter Loewy, Secretary. March 25, 1909. $200,000. Kern County.

Extension Oil Company,
418 Chamber of Commerce Bldg., Los Angeles, Cal. J. Fried, President, W. W. Warthing, Secretary. April 13, 1910. $1,000,000. Kern County.

FAIRBANKS OIL COMPANY,
2108 Shattuck Ave., Berkeley, Cal. James R. Little, President, R. H. Wetmore, Secretary. December 9, 1907. $50,000. Seven wells, Kern County.

FAIRFIELD OIL COMPANY,
30 E. 42d St., New York, N. Y. T. M. Hodgens, President, L. F. Staar, Secretary. February 10, 1911. $4,000,000. Eleven wells, Kern County.

Faithful Oil Company,
1426 Nineteenth St., Bakersfield, Cal. A. Weill, Secretary. May 20, 1909. $25,000.

Far West Oil Company,
1114 Union Oil Bldg., Los Angeles, Cal. W. S. Stewart, Secretary. June 1, 1891. $50,000.

Federal Oil Company,
1003 Higgins Bldg., Los Angeles, Cal. John Barneson, President, John A. Ferguson, Secretary. June 3, 1908. $1,000,000.

Mr. Geo. C. Fetterman,
314 Grant Bldg., Los Angeles, Cal.

Five Thirty Six Oil Company,
1047 Monadnock Bldg., San Francisco, Cal. C. L. Harvey, President, A. E. Bolton, Secretary. June 6, 1907. $100,000. Kern County.

F. M. J. Oil Company,
Bakersfield, Cal. J. W. Briscoe, President, J. A. Hughes, Secretary. April 27, 1911. $25,000.

Fort Wayne California Oil Company,
510 S. Los Robles Ave., Pasadena, Cal. P. A. Randall, President, Chas. Pfeiffer, Secretary. September 30, 1908. $300,000. Kern County.

Fossil Oil Mining and Development Company,
Merced, Cal. April 28, 1900. $100,000.

4 Oil Company,
507 Foxcroft Bldg., San Francisco, Cal. William E. Miles, President, A. J. Weston, Secretary. April 19, 1900. $300,000.

FOX AND GARRETT OIL COMPANY,
R.F.D. No. 5, Bakersfield, Cal. G. S. Butler, President, Frank Garrett, Secretary. January 3, 1910. $150,000. Four wells, Kern County.

Fox Oil Company,
Lompoc, Cal. A. Lehmann, President, E. L. Walley, Secretary. November 12, 1909. $440,000. Kern County.

Fresno Midway Land and Oil Company,
County Auditor's Office, Fresno, Cal. L. Samuels, President, S. L. Hogue, Secretary. February 17, 1908. $25,000.

Fullerton Great West Oil Company,
323 Timken Bldg., San Diego, Cal. A. J. Bradley, President, Geo. H. Hughes, Secretary. March 6, 1914. $500,000.

FULLERTON OIL COMPANY,
R.F.D. No. 4, Fullerton, Cal. John J. Fay, Jr., President, W. L. Valentine, Secretary. February 26, 1907. $600,000. Eighteen wells, Orange County.

Fullerton Oil Company,
1031 Merchants National Bank Bldg., Los Angeles, Cal. John J. Fay, Jr., President, W. L. Valentine, Secretary. May 8, 1899. $25,000.

Fulton Fuel and Road Oil Company,
Maricopa, Cal. January 17, 1912. $400,000. Kern County.

Future Success Oil Company,
Coalinga, Cal. R. Baker, President, A. A. Baker, Secretary. May 3, 1913. $100,000.

GARBUTT OIL COMPANY,
914 Merchants National Bank Bldg., Los Angeles, Cal. F. A. Garbutt, President, M. W. Stephens, Secretary. November 1, 1907. $500,000. Two wells, Los Angeles County.

Gato Ridge Oil Company,
Insurance Exchange Bldg., San Francisco, Cal. Chas. W. Gardner, President, A. E. Boynton, Secretary. June 18, 1910. $1,000,000.

GENERAL PETROLEUM COMPANY,
Higgins Bldg., Los Angeles, Cal. John Barneson, President, C. R. Stevens, Secretary. March 30, 1910. $50,000,000. Thirteen wells, Fresno County, 168 wells, Kern County, 37 wells, Orange County.

A. F. GILMORE OIL COMPANY,
R.F.D. No. 10, Los Angeles, Cal. A. F. Gilmore, President, E. B Gilmore, Secretary. Twenty wells, Los Angeles County.

Globe Exploration Company,
1003 Higgins Bldg., Los Angeles, Cal. J. W. Maddrill, President, C. R. Stevens, Secretary. March 12, 1910. $10,000,000.

Globe Oil Company,
622 Union Oil Bldg., Los Angeles, Cal. M. V. McQuigg, President, A. J. Wallace, Secretary. April 11, 1906. $500,000.

Golden State Oil Company,
501 Van Nuys Bldg., Los Angeles, Cal.

Gold Seal Petroleum Company,
905 Haas Bldg., Los Angeles, Cal. John Rowe, President, O. Park Smith, Secretary. January 19, 1915. $450,000.

GOOD LUCK OIL COMPANY,
948 Market St., San Francisco, Cal. James Madison, President, Albert Albrecht, Secretary. January 17, 1905. $100,000. Five wells, Fresno County.

GOOD ROADS OIL COMPANY,
208 Brower Bldg., Bakersfield, Cal. W. H. Hill, President, C. A. Barlow, Secretary. January 5, 1914. $50,000. Six wells, Kern County.

Grador Oil Company,
522 Security Bldg., Los Angeles, Cal. S. C. Graham, President, Arthur N. Gage, Secretary. August 16, 1908. $250,000.

Graham-Loftus Oil Company,
Santa Paula, Cal. W. Loftus, President, A. C. McKevett, Secretary. December 19, 1898. $1,000,000. Orange County.

J. E. GRAY ESTATE,
Box 263, Bakersfield, Cal. S. S. Gray, Executor. Twenty-four wells, Kern County.

GUARDIAN OIL COMPANY,
343 Sansome St., San Francisco, Cal. H. H. Beers, President, R. A. Lewin, Secretary. March 20, 1915. $500,000. Five wells, Fresno County.

Guthrey Oil Company,
433 California St., San Francisco, Cal. Geo. W. McNear, President, J. P. Rothwell, Secretary. January 5, 1906. $150,000.

HALE-M'LEOD OIL COMPANY,
926 Storey Bldg., Los Angeles, Cal. N. W. Hale, President, F. V. Gordon, Secretary. September 29, 1909. $1,500,000. Ten wells, Kern County.

Hamilton Oil and Gas Company of Los Angeles, Cal.
420 Union Oil Bldg., Los Angeles, Cal. J. A. Casebur, President, S. W. Dundway, Secretary. December 28, 1908. $100,000.

Hanford-Sanger Oil Company,
538 Merchants National Bank Bldg., Los Angeles, Cal. F. R. Dunlap, President, H. E. Woods, Secretary. January 31, 1901. $300,000. Kern County.

Harbor Crude Oil Company,
836 H. W. Hellman Bldg., Los Angeles, Cal. W. F. Young, President, C. W. De Freest, Secretary. July 13, 1915. $1,000,000.

Harlind Oil Company,
1402 Humboldt Bank Bldg., San Francisco, Cal. Chas. W. Lindsay, President, S. N. Norton, Secretary. January 27, 1910. $250,000. Kern County.

HARRIS AND STEVENS COMPANY,
Frost Bldg., Los Angeles, Cal. C. C. Harris, President, L. L. Stevens, Secretary. March 19, 1914. $75,000. Thirteen wells, Kern County.

Harter Oil Company,
322 Stimson Blk., Los Angeles, Cal. September 22, 1900. $250,000.

Haseltine Oil Company,
Fresno, Cal. R. S. Haseltine, President, B. W. Gearhart, Secretary. April 28, 1914. $25,000.

Hawaiian Oil Company,
268 Market St., San Francisco, Cal. William Matson, President, Harry B. Gregg, Secretary. June 28, 1909. $250,000. Kern County.

Hazeltine Crude Oil Company,
Bakersfield, Cal. J. W. Kelly, President, Ida M. Kelly, Secretary. November 23, 1908. $25,000.

Henderson Oil and Development Company,
724 S. Main St., Los Angeles, Cal. E. E. Henderson, President. July 12, 1912. $500,000.

Henderson Oil Company,
922 Kohl Bldg., San Francisco, Cal. Benjamin Bangs, President. June 19, 1908. $500,000. T. C. Berry, Secretary.

HENDERSON UNION OIL COMPANY,
724 S. Main St., Los Angeles, Cal. E. E. Henderson, President, W. F. Wilson, Secretary. March 20, 1911. $1,000,000. Five wells, Ventura County.

Henrietta Oil Company,
821 Mills Bldg., San Francisco, Cal. Oliver Ellsworth, President, M. A. Thomas, Secretary. October 2, 1900. $200,000. Kern County.

Hickler Oil Company,
404 S. Raymond Ave., Pasadena, Cal. W. I. Hollingsworth, President, W. H. Snudden, Secretary. February 28, 1901. $200,000.

HIDALGO OIL COMPANY,
Santa Susana, Cal. F. B. Chapin, President, C. H. Sherman, Secretary. July 19, 1913. $100,000. One well, Ventura County.

High Grade Oil Company,
409 E. Second St., Los Angeles, Cal. Henry F. Whittier, President. October 11, 1913. $25,000.

Highland Development Company,
1316 Mohawk St., Los Angeles, Cal. Milford Steele, Secretary.

Highland Oil Company,
410 Cory Bldg., Fresno, Cal. L. L. Cory, President, E. Owen, Secretary. October 13, 1899. $200,000.

Hillcrest Oil Company,
831 State St., Santa Barbara, Cal. Edwin H. Sawyer, President, A. R. Edmondson, Secretary. May 2, 1910. $500,000.

Hilltop Oil Company,
117 E. Main St., Santa Paula, Cal. I. B. Martin, President, H. H. Youngken, Secretary. April 21, 1909. $100,000. Ventura County.

HOME OIL COMPANY,
Whittier, Cal. L. Landroth, President, Alva Starbuck, Secretary. June 19, 1897. $100,000. Twelve wells, Los Angeles County.

HOME OIL COMPANY,
622 Merchants Exchange Bldg., San Francisco, Cal. J. H. Mallett, President, V. B. Fletcher, Secretary. December 16, 1896. $100,000. Five wells, Fresno County.

HOMER OIL COMPANY,
C. A. Rogers, owner. Four wells, Kern County.

HOMESTAKE OIL COMPANY,
410 Hearst Bldg., San Francisco, Cal. R. A. Clark, President, J. J. Egan, Secretary. August 29, 1899. $100,000. Five wells, Fresno County.

HOMESTEAD DEVELOPMENT COMPANY,
Insurance Exchange Bldg., San Francisco, Cal. Chas. W. Gardner, President, A. E. Boynton, Secretary. May 29, 1912. $500,000. Three wells, Fresno County.

HONDO OIL COMPANY,
1130 Van Nuys Bldg., Los Angeles, Cal. M. H. Whittier, owner. Ten wells, Kern County.

HONOLULU CONSOLIDATED OIL COMPANY,
268 Market St., San Francisco, Cal. Wm. Matson, President, W. P. Roth, Secretary. April 19, 1910. $5,000,000. Thirty-five wells, Kern County.

Honolulu Oil Company,
268 Market St., San Francisco, Cal. Wm. Matson, President, Harry B. Gregg, Secretary. June 28, 1909. $250,000.

Hopkins Oil Company,
Santa Maria, Cal. W. A. Haslam, President, Geo. Black, Secretary. July 15, 1907. $500,000.

Humauma Oil Company,
310 Sansome St., San Francisco, Cal. Harry B. Gregg, Vice President, F. Klamp, Secretary. April 16, 1910. $1,000,000.

Ibex Oil Company,
701 College St., Los Angeles, Cal. Mary B. Cales, President, E. R. Snyder, Secretary. August 25, 1908. $10,000.

IDA MAY OIL COMPANY,
Box 58, Maricopa, Cal. May 9, 1910. $600,000. Four wells, Kern County.

Ideal Oil Company,
1028 Chorro St., San Luis Obispo, Cal. H. P. Brown, President, P. A. H. Arata, Secretary. July 15, 1907. $500,000.

ILLINOIS CRUDE OIL COMPANY,
Box 168, R.F.D. No. 1, Bakersfield, Cal. T. V. Doub, President, C. E. Arnold, Secretary. July 12, 1901. $200,000. Nine wells, Kern County.

Imperial Oil Company,
350 Mills Bldg., San Francisco, Cal. J. J. Mack, President, G. Steinbach, Secretary. August 14, 1899. $100,000.

Imusdale Oil Company,
Paso Robles, Cal. H. Taylor, President. November 6, 1911. $500,000.

INCA OIL COMPANY,
245 Holbrook Bldg., San Francisco, Cal. Burton E. Green, President, M. B. Downing, Secretary. February 26, 1904. $750,000. Thirty-six wells, Fresno County.

INDIAN AND COLONIAL DEVELOPMENT COMPANY, LTD.,
Taft, Cal. Arthur Farish, President, W. S. Clegg, Secretary. (7 and 8 Wallbrook, London, E. C.). L. P. Guiberson, General Manager. Seven wells, Fresno County. December 22, 1911. £1,000.

Indian Valley Oil Company,
San Miguel, Cal. J. F. Densmore, President, E. Bergeman, Secretary. April 22, 1909. $50,000.

INTERNATIONAL OIL COMPANY,
1114 Union Oil Bldg., Los Angeles, Cal. Chester W. Brown, President, John McPeak, Assistant Secretary. April 22, 1912. $200,000. One well, Kern County.

INTERSTATE OIL COMPANY,
1010 Wright and Callender Bldg., Los Angeles, Cal. D. M. Wickersham, President, F. G. White, Secretary. November 14, 1913. $200,000. One well, Kern County.

Investment Development Company,
244 Pine St., San Francisco, Cal. Samuel Pond, President, Albert Meyer, Secretary. January 3, 1911. $100,000.

Investment Oil Company,
244 Pine St., San Francisco, Cal. S. H. Morsehead, President, Samuel Pond, Secretary. July 20, 1899. $500,000.

Iowa Oil Company,
Whittier, Cal. John E. Coffin, Secretary. September 7, 1900. $200,000.

JACKSON OIL COMPANY,
Reward, Cal. S. P. Wible, President, D. A. Jackson, Secretary. October 18, 1907. $50,000. Four wells, Kern County.

Jade Oil Company,
1005 Security Bldg., Los Angeles, Cal. R. B. Williamson, President, Geo. L. Reynolds, Secretary. October 16, 1908. $1,000,000. Kern County.

J. E. GRAY OIL COMPANY,
Box 263, Bakersfield, Cal. S. A. Gray, President, G. W. Gray, Secretary. January 13, 1909. $100,000. Twenty-six wells, Kern County.

Jesse Yarnell Company,
134 S. Bonnie Brae St., Los Angeles, Cal. Susan C. Yarnell, President, Katherine Yarnell, Secretary. April 8, 1907, $40,000.

JEWETT OIL COMPANY,
409 Brower Bldg., Bakersfield, Cal. P. L. Jewett, President, A. Weill, Secretary. August 25, 1900. $500,000. Eight wells, Kern County.

John Irwin Oil Company,
Hueneme, Cal. E. O. Gerberding, Secretary. May 10, 1893. $30,000.

Johnson Oil Company,
P.O. Box 1083, Fresno, Cal. E. Schwarz, President, R. D. Marshall, Secretary. December 4, 1908. $100,000.

John Thomas Oil Company,
91 Temple Blk., Los Angeles, Cal. E. K. Green, President, J. H. Blanchard, Secretary. August 6, 1900. $336,000.

Jordan Oil Company,
Box 193, Arcade Station, Los Angeles, Cal. J. T. Jordan, President, Ralph Martin, Secretary. May 25, 1907. $100,000.

Juanita Oil Company,
1005 Security Bldg., Los Angeles, Cal. March 6, 1908. $100,000.

JUNCTION OIL COMPANY,
58 Sutter St., San Francisco, Cal. J. Goldman, President, S. G. O. King, Secretary. February 7, 1900. $250,000. Nine wells, Kern County.

KAISER OIL COMPANY,
1114 Union Oil Bldg., Los Angeles, Cal. W. W. Orcutt, President, Giles Kellog, Secretary. March 18, 1909. $100,000. Five wells, Santa Barbara County.

KALISPELL MIDWAY OIL COMPANY,
Box 441, Bakersfield, Cal. R. A. Wilson, President, A. C. Tupman, Secretary. July 12, 1910. $250,000. Three wells, Kern County.

KANAWHA OIL COMPANY,
208 Pacific Electric Bldg., Los Angeles. John M. Sands, President, S. R. Shoup, Secretary. August 8, 1910. $500,000. One well, Kern County.

K. and V. Oil Company,
Box 482, Visalia, Cal. S. Mitchell, President, A. Q. Beals, Secretary. March 1, 1909. $100,000.

Kansas Crude Oil Company,
540 Title Insurance Bldg., Los Angeles, Cal. F. L. Sawyer, Secretary. March 11, 1910. $100,000.

Kaweah Oil Company,
Box 482, Visalia, Cal. Henry A. Scott, President, A. Q. Beals, Secretary. March 22, 1909. $100,000.

Keith and Mack Oil Company,
350 Mills Bldg., San Francisco, Cal. A. Mack, President, H. Steinbach, Secretary. December 4, 1907. $20,000.

Keith Oil and Land Company,
350 Mills Bldg., San Francisco, Cal. A. Mack, President, H. Steinbach, Secretary. November 8, 1900. $1,000,000.

Kellogg Oil Company,
933 Van Nuys Bldg., Los Angeles, Cal. F. R. Kellogg, President, G. I. Syminton, Secretary. December 9, 1910. $50,000.

Kern Cañon Oil Company,
141 Forsyth Bldg., Fresno, Cal. S. R. La Rue, President, F. L. Simons, Secretary. March 6, 1900. $200,000. Kern County.

Kern Central Oil Company,
1014 Mills Bldg., San Francisco, Cal. W. A. Brace, President, J. W. McCaughey, Secretary. December 21, 1899. $100,000.

KERN CROWN OIL COMPANY,
Box 323, East Bakersfield, Cal. J. W. Henderson, President, T. L. Moran, Treasurer. June 15, 1901. $500,000. Three wells, Kern County.

KERN FOUR OIL COMPANY,
521 Consolidated Realty Bldg., Los Angeles, Cal. F. C. Kingsbury, President, C. M. Dull, Secretary. May 26, 1909. $100,000. Twenty-two wells, Kern County.

Kern Petroleum Company,
3 Wilson Bldg., Eureka, Cal. D. J. Girard, Secretary. February 17, 1910. $250,000.

Kern Pucheu Oil Company,
106 Forsyth Bldg., Fresno, Cal. John J. Kern, President, D. A. Cowan, Secretary. February 27, 1913. $200,000.

Kern River Drillers Oil Company,
310 Sansome St., San Francisco, Cal. John Barneson, President, Virgil T. Shaw, Secretary. March 3, 1909. $1,000,000.

KERN RIVER OIL COMPANY,
238 Merchants Exchange Bldg., San Francisco, Cal. H. A. Voorman, President, Edw. C. Landis, Secretary. June 29, 1899. $100,000. Eight wells, Kern County.

KERN RIVER OIL FIELDS OF CALIFORNIA, LTD.,
1117 Los Angeles Investment Bldg., Los Angeles, Cal. R. W. Stephens, Mgr. July 6, 1910. $6,750,000. Two hundred forty-one wells, Kern County.

Kern Sunset Oil Company,
1800 Chester Ave., Bakersfield, Cal. Walter Snook, President, G. J. Planz, Secretary. March 27, 1908. $10,000. Kern County.

KERN TRADING AND OIL COMPANY,
850 Flood Bldg., San Francisco, Cal. W. R. Scott, President, G. L. King, Secretary. May 22, 1903. $10,000,000. One hundred twenty-two wells, Fresno County. 389 wells, Kern County.

Kern Union Oil Company,
334 H. W. Hellman Bldg., Los Angeles, Cal. July 8, 1910. $100,000.

Keystone Oil Company,
1015 Baker-Detwiler Bldg., Los Angeles, Cal. October 2, 1914. $500,000.

Kings River Oil Company,
Box 6, R.F.D. No. 8, Fresno, Cal. Burton Elwood, President, Florence Marlar, Secretary. June 5, 1899. $100,000.

Knickerbocker Oil Company,
100 Davis St., San Francisco, Cal. J. D. Spreckels, Jr., President, G. B. Waterman, Secretary. March 15, 1911. $400,000.

KNOB HILL OIL COMPANY,
202 Cory Bldg., Fresno, Cal. Jas Porteous, President, W. J. Kittrell, Secretary. August 6, 1900. $25,000. Thirty wells, Kern County.

Kopje Oil Company,
Box 1306, Fresno, Cal. Geo. S. Waterman, President, M. W. Dearing, Secretary. January 4, 1901. $100,000.

Kramer Consolidated Oil Company,
403 Germain Bldg., Los Angeles, Cal. A. N. Hamilton, President, D. F. Wilson, Secretary. November 2, 1900. $600,000.

Kramer Model Oil Company,
403 Germain Bldg., Los Angeles, Cal. Lester S. Moore, President, Chas. T. Merritt, Secretary. April 29, 1910. $21,000.

La Belle Oil Company,
714 Central Bldg., Los Angeles, Cal. W. P. Cunningham, President, Stone Hastain, Secretary. March 5, 1909. $100,000.

LA BLANC OIL COMPANY,
227 First National Bank Bldg., Oakland, Cal. J. C. Downey, President, W. V. Harington, Secretary. October 1, 1908. $250,000. Two wells, Kern County.

Lacey Oil Company,
Hanford, Cal. November 1, 1909. $500,000. R. V. Hall, Secretary.

La Corona Oil and Asphalt Company,
East Bakersfield, Cal. Louis V. Olcese, President, J. B. Hewitt, Secretary. October 9, 1897. $19,000.

Laguna Oil Company,
San Luis Obispo, Cal. P. Tognazzini, President, M. D. Tognazzini, Secretary. March 3, 1907. $500,000.

La Habra Oil Company,
204 I. W. Hellman Bldg., Los Angeles, Cal. L. P. Hanson, President, L. G. McLaughlin, Secretary. April 6, 1910. $500,000.

Lakeshore Oil Company,
510 Crocker Bldg., San Francisco, Cal. Geo. T. Cameron, President, R. A. Morton, Secretary. October 22, 1909. $750,000.

Lake View Annex Oil Company,
622 Bumiller Bldg., Los Angeles, Cal. November 12, 1910. $2,600,000.

LAKE VIEW NO. 2 OIL COMPANY,
1011 Wright and Callender Bldg., Los Angeles, Cal. C. H. White, President, F. G. White, Secretary. May 11, 1910. $1,000,000. Kern County.

LAKE VIEW OIL COMPANY,
Union Oil Bldg., Los Angeles, Cal. W. W. Orcutt, President, Giles Kellogg, Secretary. December 9, 1909. $2,500,000. Five wells, Kern County.

Lemoore Oil Company,
Lemoore, Cal. September 15, 1909. $300,000.

Le Roy Oil Company,
241 Sansome St., San Francisco, Cal. February 8, 1913. $100,000.

Light Oil Extension Company,
1241 Flood Bldg., San Francisco, Cal. Louis Nathan, President, C. S. Wilcox, Secretary. November 25, 1908. $500,000.

Linda Vista Oil Company,
1206 Broadway, Oakland, Cal. E. A. Heron, President, A. H. Breed, Secretary. November 23, 1900. $250,000.

Lindsay Incorporated Oil Company,
Lindsay, Cal. L. A. Sturgeon, President, L. G. Stallings, Secretary. November 11, 1909. $200,000.

Lion Oil Company,
474 N. First St., San Jose, Cal. S. W. Waterhouse, President, Annie C. Waterhouse, Secretary. September 2, 1914. $25,000.

Liscomb and Bridge,
38 E. Union St., Pasadena, Cal.

Little Jack Oil Company,
Hanford, Cal. Thos. Downing, President. May 16, 1912. $100,000.

Little Sespe Consolidated Oil Company,
A. W. Roberts, President, W. P. W. Martin, Secretary. 407 Mason Bldg., Los Angeles, Cal. August 1, 1905. $30,000.

Loma Oil Company,
648 S. Olive St., Los Angeles, Cal. Frank A. Garbutt, President, S. C. Hall, Secretary. October 14, 1895. $50,000.

Lompoc Monarch Oil Company,
520 Rialto Bldg., San Francisco, Cal. H. A. Broughton, President, N. Huseman, Secretary. May 25, 1914. $1,000,000.

Lompoc Oil Development Company,
Lompoc, Cal. W. J. Packard, President, F. J. Miller, Secretary. September 4, 1900. $300,000.

Lopez Cañon Oil Company,
Room 716, 74 New Montgomery St., San Francisco. Care A. L. Darrow, President. C. E. van Barneveld, Secretary.

Los Alamos Petroleum Company,
615 I. W. Hellman Bldg., Los Angeles, Cal. J. M. Kellerman. October 2, 1907. $500,000.

Los Angeles Cherokee Oil Company,
1117 Trust and Savings Bldg., Los Angeles, Cal. Dan Murphy, President, G. Holterhoff, Jr., Secretary. April 20, 1904. $1,000,000.

Los Angeles-Coalinga Oil Syndicate,
307 Severance Bldg., Los Angeles, Cal. W. C. Elderton, President, W. W. Pedder, Secretary. July 8, 1909. $60,000.

LOS ANGELES-KERN OIL COMPANY,
1007 Haas Bldg., Los Angeles, Cal. M. W. Harker, President, H. W. Pettehue, Secretary. December 10, 1908. $400,000. Five wells, Kern County.

Los Angeles McKittrick Oil Company,
410 First National Bank Bldg., Riverside, Cal. Geo. B. Bush, Secretary. March 17, 1910. $1,000,000.

LOS ANGELES OIL COMPANY,
1114 Union Oil Bldg., Los Angeles, Cal. W. L. Stewart, President, Giles Kellogg, Secretary. October 23, 1874. $50,000. Two wells, Ventura County.

Los Flores Land and Oil Company,
510 Crocker Bldg., San Francisco, Cal. Geo. T. Cameron, President, R. A. Morton, Secretary. July 25, 1902. $1,000,000. Santa Barbara.

Los Pozos Oil Company,
Box 34, Bakersfield, Cal. February 16, 1910. $50,000.

LOST HILLS DEVELOPMENT COMPANY,
Visalia, Cal. Daniel Calcote, President, E. C. Farnsworth, Secretary. June 19, 1914. $720,000. Thirteen wells, Kern County.

Lost Hills Investment Company,
245 Holbrook Bldg., San Francisco, Cal. Frank H. Buck, President, O. Scribner, Secretary. December 20, 1911. $24,000.

Lost Hills Mining Company,
510 Crocker Bldg., San Francisco, Cal. Geo. T. Cameron, President, R. A. Morton, Secretary. March 12, 1909. $100,000.

Lo Tengo Oil Company,
323 Timken Bldg., San Diego, Cal. Thomas B. Darst, President, Chas. B. Stevens, Secretary. June 27, 1910. $1,000,000. San Diego County.

LUCILE OIL COMPANY,
Coalinga, Cal. Mrs. Ida Robertson, President, R. W. Dallas, Secretary. February 23, 1905. $50,000. Three wells, Fresno County.

Lucky Boy Oil Company,
631 Wesley Roberts Bldg., Los Angeles, Cal. C. Wesley Roberts, President, Wm. K. Weaver, Secretary. September 14, 1909. $750,000. Kern County.

Mahaska Oil Company,
6919 Hawthorne Ave., Los Angeles, Cal. W. C. Sheppard, President. March 19, 1910. $100,000.

MAIN STATE OIL COMPANY,
433 California St., San Francisco, Cal. F. W. McNear, President, J. P. Rothwell, Secretary. January 16, 1900. $250,000. Four wells, Fresno County.

Majestic Oil Company,
Santa Maria, Cal. F. C. Twitchell, President, Geo. P. Merritt, Secretary. June 15, 1907. $500,000.

MAMMOTH OIL COMPANY,
1201 Federal Realty Bldg., Oakland, Cal. C. J. Berry, President, C. H. Holbrook, Secretary. February 4, 1910. $1,000,000. Five wells, Kern County.

Manhattan Midway Oil Company,
1100 Hibernian Bldg., Los Angeles, Cal. S. E. Vermilyea, President, E. E. Edwards, Secretary. January 2, 1909. $75,000. Kern County.

M AND T OIL COMPANY,
703 Syndicate Bldg., Oakland, Cal. M. J. Laymance, President, S. S. Hawley, Secretary. January 15, 1910. $300,000. Three wells, Kern County.

MANLEY AND M'GINN,
Shale, Cal. J. R. Murphy, Auditor. Ten wells, Kern County.

Marathon Oil Company,
Dinuba, Cal. W. B. Nichols, President, Clarence Wilson, Secretary. May 19, 1909. $75,000.

MARCH OIL COMPANY,
714 Marsh Strong Bldg., Los Angeles, Cal. B. A. Hayden, President, F. E. Valentine, Secretary. Eight wells, Kern County.

Marian Oil Company of California,
Coalinga, Cal. O. D. Loftus, President, J. A. Fluetsch, Secretary. March 25, 1909. $150,000.

Maricopa Investment Company,
Maricopa, Cal. W. J. Schultz, President, E. L. Weed, Secretary. May 25, 1910. $25,000. Kern County.

MARICOPA NATIONAL PETROLEUM COMPANY,
Box 411, Fresno, Cal. A. S. Cleary, President, E. V. Williams, Secretary. February 16, 1910. $400,000. Two wells, Kern County.

Maricopa Northern Oil Company,
347 Title Insurance Bldg., Los Angeles, Cal. R. Mansard, President, M. M. Miles, Secretary. August 21, 1914. $1,000,000.

Maricopa Oil Company,
Stoner Block, Bakersfield, Cal.

Maricopa Oil Company,
Maricopa, Cal. W. J. Schultz, President, Theo. W. Bernhard, Secretary. December 5, 1907. $500,000. Kern County.

Maricopa Producers Oil Company,
320 Balboa Bldg., San Francisco, Cal. April 11, 1910. $500,000.

Maricopa Queen Oil Company,
434 First National Bank Bldg., Long Beach, Cal. W. S. Wilhelm, President, W. S. Brayton, Secretary. October 8, 1910. $1,000,000.

MARICOPA STAR OIL COMPANY,
1011 Security Bldg., Los Angeles, Cal. Thos. A. O'Donnell, President, Ellis T. Yarnell, Secretary. October 29, 1913. $100,000. Five wells, Kern County.

Maricopa-Strawn Oil Company,
Maricopa, Cal. W. J. Barnhart, President, R. A. Crump, Secretary. May 21, 1915. $100,000.

MARICOPA 36 OIL COMPANY,
Alaska Commercial Bldg., San Francisco, Cal. O. H. Greenwald, President, P. D. Kahn, Secretary. February 3, 1910. $250,000. One well, Kern County.

Marion Oil Company,
Flatiron Bldg., San Francisco, Cal. Henry Ach, President, A. A. Power, Secretary. November 5, 1908. $600,000.

Marshall Oil Company,
111 Montgomery St., San Francisco, Cal. April 27, 1910. $125,000.

MASCOT OIL COMPANY,
577 I. W. Hellman Bldg., Los Angeles, Cal. T. Spellacy, President, W. M. Wallace, Secretary. November 11, 1901. $500,000. Thirty-seven wells Kern County.

Maxwell Oil Company,
716 Sheldon Bldg., San Francisco, Cal. A. F. L. Bell, President, John J. Avis, Secretary. $25,000.

MAY OIL COMPANY,
408 Consolidated Realty Bldg., Los Angeles, Cal. M. W. Mead, President, L. Schenck, Secretary. May 7, 1902. $200,000. Eight wells, Kern County.

Mays Consolidated Oil Company,
Fellows, Cal. Box E. F. B. Chapin, President, C. H. Sherman, Secretary. May 19, 1911. $2,000,000.

M'CUTCHEON BROTHERS,
G. W. McCutcheon, Mgr., Maricopa, Cal. Five wells, Kern County.

McKittrick Extension Oil Company,
Brower Bldg., Bakersfield, Cal. S. P. Wible, President, C. Brower, Secretary. November 1, 1900. $350,000.

McKittrick Front Oil Company,
501 Crocker Bldg., San Francisco, Cal. W. F. Williamson, President, Albert J. Dibblee, Secretary. April 29, 1910. $50,000. Kern County.

M'KITTRICK OIL COMPANY,
Brower Bldg., Bakersfield, Cal. H. A. Jastro, President, C. Brawer, Secretary. November 18, 1899. $500,000. Two wells, Kern County.

McKittrick Prosperity Petroleum Company,
Nevada City, Cal. A. R. Lord, President, C. W. Chapman, Secretary. November 20. 1900. $500,000.

Mecca Oil Company,
Bakersfield, Cal. D. H. McConnell, President, A. D. Henderson, Secretary. April 23, 1901. $450,000. Kern County.

MECCA OIL COMPANY NO. 2,
Bakersfield, Cal. D. H. McConnell, President, A. D. Henderson, Secretary. July 9, 1912. $100,000. Seven wells, Kern County.

MELITA OIL COMPANY,
First National Bank Bldg., San Francisco, Cal. Thomas G. Hutt, President, H. A. Rispin, Secretary. Sixteen wells, Kern County.

MERCANTILE CRUDE OIL COMPANY,
504 Grant Bldg., San Francisco, Cal. Peter Caubu, President. Peter B. Stumpf, Secretary. December 18, 1900. $200,000. Three wells, Fresno County.

Mercedes Oil Company,
Room 201, 127 Montgomery St., San Francisco, Cal. Washington Dodge, President, M. White, Secretary. July 30, 1910. $1,000,000.

Merced Oil Mining Company,
Merced, Cal. C. H. Castle, President, M. D. Wood, Secretary. January 24, 1900. $100,000. Fresno County.

Merced Paraffine Oil Company,
Los Banos, Cal. O. D. Bambauer, President, A. S. Salau, Secretary. June 19, 1914. $1,000,000. San Benito County.

Mericos Oil Company,
524 Auditorium Bldg., Los Angeles, Cal Burton E. Green, President, Calvin C. Green, Secretary. November 7, 1901. $10,000.

Meteor Oil Company,
826 Higgins Bldg., Los Angeles, Cal.

Mexican Associated Oil Company,
232 S. Broadway, Los Angeles, Cal. Cal. F. Hunter, President, Chas. L. Wilde, Secretary. April 1, 1910. $1,500,000.

Mexican Petroleum Company,
1015 Security Bldg., Los Angeles, Cal. E. L. Doheny, President, O. D. Bennett, Secretary. December 20, 1900. $10,000,000.

M. G. AND P. OIL COMPANY,
Box 34, Bakersfield, Cal. H. E. Wright, President, T. M. Young, Secretary. June 7, 1910. $500,000. Three wells, Kern County.

Midas Oil Company,
230 California St., San Francisco, Cal. James Rolph, Jr., President, C. P. Chamberlain, Secretary. March 18, 1910. $200,000.

Midget Oil Company,
60 California St., San Francisco, Cal. J. D. Spreckels, Jr., President, W. H. Hannan, Secretary. April 11, 1910. $25,000.

MIDLAND OIL COMPANY,
1015 Security Bldg., Los Angeles, Cal. J. C. Anderson, President, Dr. Norman Bridge, Secretary. November 20, 1908. $100,000. Six wells, Kern County.

MIDLAND OIL FIELDS COMPANY, LTD.,
1015 Security Bldg., Los Angeles, Cal. T. A. O'Donnell, President, Dr. Norman Bridge, Secretary. April 15, 1910. $1,000,000. Two wells, Kern County.

Midway Basin Oil Company,
319 Consolidated Realty Bldg., Los Angeles, Cal. A. G. Stearns, President, April 13, 1910, $500,000.

Midway Columbian Oil Company,
744 Hastings St., Vancouver, B. C. Wm. A. Bauer, Chairman, F. W. Bauer, Secretary. June 18, 1912. $500,000. Kern County.

MIDWAY CONSOLIDATED LIMITED,
Box 141, Fellows, Cal. A. J. Abrahams, President, 35 Copthall Ave., London, E. C.; C. F. Burton, Secretary, 35 Copthall Ave., London, E. C.. Wm. O. Maxwell, General Manager. October 21, 1913. $100,000. Two wells, Kern County.

Midway Field Oil Company,
740 S. Broadway, Los Angeles, Cal. C. E. Groat, President, Ben R. Meyer, Secretary. August 8, 1910. $1,000,000. Kern County.

MIDWAY FIVE OIL COMPANY,
554 I. W. Hellman Building, Los Angeles, Cal. Edwin L. Martin, President, F. L. Bortells, Secretary. March 22, 1910. $1,000,000. Five wells, Kern County.

MIDWAY GAS COMPANY,
805 Garland Bldg., Los Angeles, Cal. A. B. Macbeth, General Manager. Seven wells, Kern County .

MIDWAY NORTHERN OIL COMPANY,
346 Title Insurance Bldg., Los Angeles, Cal. W. S. McGiffert, President, M. M. Miles, Secretary. October 15, 1910. $1,000,000. Two wells, Kern County.

Midway Oil Company,
Room 512, 112 Market St., San Francisco, Cal. J. Ogden, President. A. Heyman, Secretary. February 6, 1900. $1,000,000. Kern County.

Midway Oil Company,
302 Concord Bldg., Portland, Oregon. A. E. Davis, Secretary. May 4, 1901. $1,000,000.

MIDWAY PACIFIC OIL COMPANY,
406 Story Bldg., Los Angeles, Cal. Philip L. Wilson, President, P. F. Schumacher, Secretary. April 18, 1910. $2,000,000. Five wells, Kern County.

MIDWAY PEERLESS OIL COMPANY,
617 Merritt Bldg., Los Angeles, Cal. M. H. Whittier, President, H. L. Westbrook, Secretary. February 28, 1911. $600,000. Eight wells, Kern County.

MIDWAY PREMIER OIL COMPANY,
1201 Federal Realty Bldg., Oakland, Cal. A. J. Snyder, President, L. E. Bowen, Secretary. March 18, 1910. $1,000,000. Nine wells, Kern County.

MIDWAY ROYAL PETROLEUM COMPANY,
648 S. Olive St., Los Angeles, Cal. F. A. Garbutt, President, A. T. Jergens, Secretary. October 13, 1913. $1,000,000. Nine wells, Kern County.

Midway Simi Oil Company,
Box 34, Bakersfield, Cal. T. M. Young, President, G. R. Peckham, Secretary. October 9, 1913. $100,000.

Millie Francis Oil Company,
Box 8, Taft, Cal. Kern County.

Mr. Jeremiah Miller,
Coalinga, Cal.

Minoru Oil Company,
1208 Alaska Commercial Bldg., San Francisco, Cal. John Barneson, President, W. J. Dinsmore, Secretary. June 2, 1909. $500,000.

MIOCENE OIL COMPANY,
518 Mills Bldg., San Francisco, Cal. P. Welch, President, Jas. D. Sweeney, Secretary. July 5, 1912. $20,000. Two wells, Kern County.

M. J. AND M. M. CONSOLIDATED,
703 Oakland Bank of Savings Bldg., Oakland, Cal. F. J. Woodward, President, Steb C. Teal, Secretary. August 22, 1910. $2,000,000. Twenty-three wells, Kern County.

M. K. and T. Oil Company,
232 First National Bank Bldg., Oakland, Cal. George D. Metcalf, President, J. B. Metcalf, Secretary. January 15, 1900. $300,000. Fresno County.

Mocal Oil Company,
Shale, Cal. Chas. Rittersbacher, President, Elmer Rittersbacher, Secretary. June 9, 1911. $300,000.

MODELO OIL COMPANY,
600 Market St., San Francisco, Cal. A. F. Morrison, President, W. R. Berry, Secretary. April 26, 1898. $250,000. Thirteen wells, Ventura County.

Mogul Oil Company,
Visalia, Cal. I. Shiffert, President, L. C. Branch, Secretary. October 6, 1909. $100,000.

Monarch Oil Company,
East Bakersfield, Cal. Louis V. Olcese, President, J. B. Hewitt, Secretary. February 3, 1900. $100,000.

Montana Fresno Oil Company,
Blackstone St., Fresno, Cal. Geo. W. Smith, Secretary. January 14, 1900. $14,000.

MONTEBELLO OIL COMPANY,
Insurance Exchange Bldg., San Francisco, Cal. Chas. W. Gardner, President, A. E. Boynton, Secretary. May 5, 1909. $1,000,000. Seventy-four wells, Ventura County.

MONTE CRISTO OIL AND DEVELOPMENT COMPANY,
705 Flatiron Bldg., San Francisco, Cal. Henry Ach, President, A. A. Power, Secretary. December 5, 1899. $1,000,000. Eighty-eight wells, Kern County, seven wells, Los Angeles County.

Monterey Oil Company,
Parkfield, Cal. W. W. Carland, President. April 29, 1914. $1,000,000.

Morro Bay Oil Company,
San Luis Obispo, Cal. A. Fitzgerald, President, Aug. Vollmer, Secretary. May 16, 1907. $1,000,000.

MT. DIABLO OIL MFG. AND DEVELOPMENT COMPANY,
517 Central Bldg., Los Angeles, Cal. James Cullingham, President, N. K. Potter, Secretary. February 23, 1900. $500,000. Four wells, Kern County.

M. P. Oil Company,
801 Baker St., Bakersfield, Cal. A. S. Crites, President, M. P. Flickinger, Secretary. May 8, 1909. $21,000.

Munro Oil Company,
521 Story Bldg., Los Angeles, Cal. Geo. W. Walker, President, F. V. Gordon, Secretary. April 25, 1912. $50,000. Kern County.

Muriel Oil Company,
1208 Alaska Commercial Bldg., San Francisco, Cal. John Barneson, President, W. J. Dinsmore, Secretary. April 22, 1909. $250,000.

Murphy Oil Company,
Whittier, Cal. William H. Murphy, President, J. T. F. Baeyertz, Secretary. August 18, 1904. $2,000,000. Los Angeles County.

MUSCATINE OIL COMPANY,
809 Trust and Savings Bldg., Los Angeles, Cal. Miro Hershey, President, J. C. Macfarland, Secretary. August 3, 1908. $300,000. Three wells, Kern County.

MUTUAL OIL COMPANY,
1006 California Bldg., Los Angeles, Cal. G. L. Holton, President, Chas. L. Talbot, Secretary. May 11, 1907. $400,000. One well, Ventura County.

Nacirema Oil Company,
605 Ferguson Bldg., Los Angeles, Cal. R. A. Broomfield, President, W. C. Cushing, Secretary. September 29, 1909. $50,000.

National Oil Company,
627 E. Third St., Los Angeles, Cal. Harry H. Schwartz, President, Samuel S. Schwartz, Secretary. June 15, 1915. $10,000.

NATIONAL PACIFIC OIL COMPANY,
1021 Higgins Bldg., Los Angeles, Cal. John Barneson, President, E. B. Kidson, Secretary. December 6, 1911. $3,500,000. Two wells, Kern County.

National Petroleum Company,
1025 Higgins Bldg., Los Angeles, Cal. J. P. Straughan, Manager. April 24, 1913. $100,000.

Natoma Oil Company,
510 Crocker Bldg., San Francisco, Cal. W. R. Berry, President, R. A. Morton, Secretary. July 3, 1911. $500,000.

Neosho Oil Company,
906 Central Bldg., Los Angeles, Cal. Ralph B. Lloyd, President, W. E. Lloyd, Secretary. March 22, 1913. $75,000.

NETHERLANDS OIL COMPANY,
1910 Mariposa St., Fresno, Cal. W. B. Holland, President, B. Epstein, Secretary. March 5, 1909. $200,000. Two wells, Fresno County.

NEVADA COUNTY OIL COMPANY,
1201 Union Oil Bldg., Los Angeles, Cal. D. E. Morgan, President, W. B. Robb, Secretary. September 22, 1900. $250,000. Eleven wells, Kern County.

Nevada Pacific Oil Company,
523 Balboa Bldg., San Francisco, Cal. September 29, 1909. $100,000.

NEVADA PETROLEUM COMPANY,
1026 Crocker Bldg., San Francisco, Cal. M. L. Requa, President, G. D. Abbott, Secretary. December 23, 1908. $5,000,000. Eighteen wells, Fresno County.

New Castaic Oil Company,
1525 Brooklyn Ave., Los Angeles, Cal. Geo. Alspack, President, G. D. Garner, Secretary. March 19, 1909. $500,000.

NEW CENTER OIL COMPANY,
Room 637, 58 Sutter St., San Francisco, Cal. D. S. Bachman, President, A. N. Baldwin, Secretary. September 25, 1905. $25,000. Five wells, Kern County.

New England Oil Company,
119 E. Colorado St., Pasadena, Cal. M. E. Wood, President, M. D. Snowball, Secretary. April 16, 1900. $300,000.

Newhall Mountain Oil Company,
402 Copp Bldg., Los Angeles, Cal. L. D. Swartwout, President, S. L. Wallis, Secretary. October 19, 1901. $50,000.

New Hope Oil Company,
729 Mills Bldg., San Francisco, Cal. C. D. Loumeister, President, W. E. Dennison, Secretary. October 3, 1899. $100,000.

New Light Oil Company, 1959 Mills Bldg., San Francisco. Wallace Barstow, President, D. M. Kent, Secretary. November 3, 1909. $1,000,000. Kern County.

NEWLOVE OIL COMPANY, 1114 Union Oil Bldg., Los Angeles, Cal. W. W. Orcutt, President, Giles Kellogg, Secretary. April 30, 1906. $1,500,000. Thirty-six wells, Santa Barbara County.

Newman Morris Oil and Land Company, Cor. Eddy and Powell Sts., San Francisco, Cal. W. W. Kaye, President, Chas. J. Newman, Secretary. January 3, 1912. $500,000.

NEW PENNSYLVANIA PETROLEUM COMPANY, Box 447, Santa Maria, Cal. T. R. Finley, President, G. M. Scott, Secretary, August 6, 1904. $500,000. Three wells, Santa Barbara County.

New San Francisco Crude Oil Company, 904 I St., Fresno, Cal. H. H. Welsh, President, W. J. O'Neill, Secretary. January 17, 1902. $150,000. Fresno County.

NILES LEASE COMPANY, 1015 Security Bldg., Los Angeles, Cal. E. L. Doheny, President, Norman Bridge, Secretary. February 17, 1908. $1,000,000. Nine wells, Los Angeles County.

NORTH AMERICAN OIL CONSOLIDATED, 903 Flat Iron Bldg., San Francisco, Cal. Louis Titus, President, C. F. Nance, Secretary. February 3, 1910. $15,000,000. Sixty-four wells, Kern County.

Northern Exploration Company, 805 Garland Bldg., Los Angeles, Cal. A. E. Peat, Secretary.

North Midway Oil Company, Box 598, Santa Monica, Cal. L. W. Andrews, President, Roy Jones, Secretary. November 8, 1909. $200,000.

Oakburn Oil Company, 1003 Higgins Bldg., Los Angeles, Cal. J. W. Maddrill, President, C. R. Stevens, Secretary. February 8, 1910. $1,000,000.

Oakland Oil Company, 460 Holbrook Bldg., San Francisco, Cal. W. T. Sesnon, Vice President, A. J. Samuel, Secretary. September 14, 1899. $20,000. Kern County.

Oak Ridge Oil Company, Insurance Exchange Bldg., San Francisco, Cal. Chas. W. Gardner, President, A. E. Boynton, Secretary. January 6, 1911. $5,000,000.

OBISPO OIL COMPANY, Box 341, San Luis Obispo, Cal. J. W. Barneberg, F. H. Throop, Secretary. February 25, 1909. $500,000. Two wells, Kern County.

Occident Oil Company, 1927 Mariposa St., Fresno, Cal. E. W. Risley, President, W. O. Miller, Secretary. May 13, 1899. $32,000.

Octave Oil Company, 1011 Security Bldg., Los Angeles, Cal. M. H. Whittier, President, T. A. O'Donnell, Secretary. April 11, 1903. $50,000.

Ohio Crude Oil Company, 346 Pacific Electric Bldg., Los Angeles, Cal. June 4, 1910. $300,000.

OIL EXPLORATION COMPANY, 1201 Nevada Bank Bldg., San Francisco, Cal. Jos. Errington, President, J. P. Sweeney, Secretary. August 8, 1910. $300,000. Five wells, Fresno County.

Oil Land Exploration Company, Humboldt Bank Bldg., San Francisco, Cal. John P. Fraser, President, H. F. Peart, Secretary. February 23, 1909. $250,000.

Ojai Oil Company, 622 Bumiller Bldg., Los Angeles, Cal. F. E. Dunlap, President, W. I. Turck, Secretary. June 4, 1900. $750,000.

OJAI VALLEY PETROLEUM COMPANY, 207 Homer Laughlin Bldg., Los Angeles, Cal. S. H. Watson, President. James A. Haskett, Secretary. March 11, 1909. $750,000. Twenty wells, Kern County.

Old Gibraltar Oil Company, 632 E. Main St., Stockton, Cal. September 19, 1910. $1,000,000.

Old Keystone Oil Company, 1114 Union Oil Bldg., Los Angeles, Cal. Lyman Stewart, President, John McPeak, Secretary. February 15, 1897. $100,000.

Olema Oil Company, 822 Mills Bldg., San Francisco, Cal. Oliver Ellsworth, President, M. A. Thomas, Secretary. October 2, 1900. $200,000. Kern County.

Oleum Terra Company, 2706 Brighton Ave., Los Angeles, Cal. E. C. Freeman, President, John G. Todd, Secretary. January 9, 1901. $16,000.

OLIG CRUDE OIL COMPANY, 2827 La Salle Ave., Los Angeles, Cal. Geo. W. Walder, President, J. H. Purdy, Secretary. September 28, 1904. $500,000. Eight wells, Kern County.

Olig Land Company, 2827 La Salle Ave., Los Angeles, Cal. Geo. W. Walder, President, J. H. Purdy, Secretary. February 14, 1908. $50,000.

OLINDA LAND COMPANY, 702 Equitable Bldg., Los Angeles, Cal. W. H. Bailey, Jr., President, M. Sutherland, Secretary. August 31, 1900. $2,000,000. Ten wells, Orange County.

On Top Oil Company, 424 Wilcox Bldg., Los Angeles, Cal. J. J. O'Brien, President, V. L. O'Brien, Secretary. March 29, 1915. $25,000. Kern County.

The Opal Oil Company, Security Bldg., Los Angeles, Cal. J. M. Danziger, President, Wilbert Morgrage, Secretary. May 26, 1908. $50,000.

Ophir Oil Company, 1208 Alaska Commercial Bldg., San Francisco, Cal. John Barneson, President, W. J. Dinsmore, Secretary. October 7, 1909. $100,000. Fresno County.

Orange Oil Company,
303 Tajo Bldg., Los Angeles, Cal. W. B. Scott, President, W. Astley, Secretary. August 22, 1907. $100,000.

ORCUTT OIL COMPANY,
Lompoc, Cal. A. Lehmann, President, L. Kahn, Secretary. December 21, 1907. $300,000. Five wells, Santa Barbara County.

Osage Fifty-eight Oil Company,
1130 I. N. Van Nuys Bldg., Los Angeles, Cal. M. H. Whittier, President, F. B. Sutton, Secretary. March 6, 1905. $500,000.

Otay Oil Company.
902 American National Bank Bldg., San Diego, Cal. N. J. Hohner, President, G. W. Johnston, Secretary. January 3, 1910. $125,000. San Diego County.

OZARK OIL COMPANY,
Box 564, Los Angeles, Cal. W. P. Janes, President, O. H. Burke, Secretary. July 18, 1907. $250,000. Four wells, Fresno County.

PACIFIC CRUDE OIL COMPANY,
Santa Marina Bldg., San Francisco, Cal. G. H. Easton, President, John Lee, Jr., Secretary. May 19, 1911. $750,000. Three wells, Kern County.

PACIFIC L. AND P. COMPANY,
608 P. E. Bldg., Los Angeles, Cal. G. C. Ward, Vice President, O. V. Showers, Secretary. Forty wells, Los Angeles County.

Pacific Midway Oil Company,
822 Mills Bldg., San Francisco, Cal. B. S. Noyes, President, B. Romaine, Secretary. January 31, 1910. $250,000. 4 wells, Kern County.

Pacific Oil Fields, Ltd.,
350 California St., San Francisco, Cal. Balfour, Guthrie and Company, Agts. A. B. Williams, F. W. Bishop, London E. C. December 23, 1907. £250,000. Santa Barbara County.

PACIFIC STATES PETROLEUM COMPANY,
P.O. Box B-2, Coalinga, Cal. G. W. Richard, President, L. L. Richard, Secretary. April 23, 1909. $300,000. One well, Fresno County.

Palladium Investment Company,
648 S. Olive St., Los Angeles, Cal. Frank A. Garbutt, President, A. T. Jergens, Secretary. May 28, 1910. $100,000.

Palmer Annex Oil Company,
605 H. W. Hellman Bldg., Los Angeles, Cal. C. B. Eyer, President, Chas. Tutschulte, Secretary. June 5, 1909. $2,000,000.

PALMER UNION OIL COMPANY,
Sisquoc, Cal. John M. Williamson, President, M. F. Lewis, Secretary. December 5, 1910. $10,000,000. Five wells, Kern County. Four wells, San Barbara County.

PANTHEON OIL COMPANY,
First National Bank Bldg., San Francisco, Cal. Robert Hays Smith, President, W. H. Humphreys, Secretary. February 28, 1910. $750,000. Two wells, Fresno County.

PARAFFINE OIL COMPANY,
Box 566, Bakersfield, Cal. H. T. Condict, President, T. F. Minor, Secretary. January 24, 1901. $300,000. Five wells, Kern County.

Paragon Oil Sales Company,
Temple Bldg., Los Angeles, Cal. March 22, 1915. $50,000.

Paraiso Oil Company,
512 Syndicate Bldg., Oakland, Cal. J. E. Ennis, President, J. N. Turner, Secretary. September 18, 1914. $200,000. Santa Clara County.

Parker Oil Company,
1134 W. Eighteenth St., Los Angeles, Cal. Nettie A. Parker, President, M. F. Klingaman, Secretary. May 16, 1900. $250,000.

Parkfield Pioneer Oil Company,
909 Mutual Bank Bldg., San Francisco, Cal. H. B. Hayden, President. July 15, 1911. $2,000,000.

PATRICA OIL COMPANY,
Box 441, Bakersfield, Cal. F. A. Carrick, President, A. C. Tupman, Secretary. May 21, 1910. $250,000. Seventeen wells, Kern County.

Pauson Oil Company,
180 Sutter St., San Francisco, Cal. Frank Pauson, President, J. W. Pauson, Secretary. November 5, 1904. $100,000.

P. C. L. Oil Company,
Visalia, Cal. Chas. G. Lamberson, Treasurer. November 26, 1909. $100,000.

PEERLESS OIL COMPANY,
824 Crocker Bldg., San Francisco, Cal. John M. Wright, President, H. C. Park, Secretary. October 9, 1899. $1,000,000. Fifty-nine wells, Kern County.

PENN COALINGA PETROLEUM COMPANY,
First National Bank Bldg., San Francisco, Cal. Ira L. Bryner, President, R. H. Smith, Secretary. June 26, 1905. $350,000. Nine wells, Fresno County.

Pentland Union Petroleum Company,
401 Union Oil Bldg., Los Angeles, Cal. Edward Fox, President, F. C. Lamb, Secretary. June 29, 1912. $1,500,000.

Perseus Oil Company,
317 Merchants Trust Bldg., Los Angeles, Cal. T. H. Dudley, President, W. H. Dowsing, Secretary. March 7, 1901. $200,000. Kern County.

Petra Oil Company,
Room 110, 166 Geary St., San Francisco, Cal. L. A. Sheiger, President, N. J. Naginnity, Secretary. August 18, 1910. $18,000.

THE PETROL COMPANY,
Santa Susana, Cal. T. G. Gabbert, President, B. C. Nelson, Secretary. November 21, 1912. $110,000. Eleven wells, Ventura County.

THE PETROLEUM COMPANY,
408 Consolidated Realty Bldg., Los Angeles, Cal. M. H. Mosier, President, Geo. H. Johnson, Secretary. September 30, 1910. $250,000. Five wells, Orange County.

PETROLEUM DEVELOPMENT COMPANY,
206 Kerchoff Bldg., Los Angeles, Cal. E. O. Faulkner, President, G. Holterhoff, Jr., Secretary. May 26, 1899. $125,000. One hundred eight wells, Kern County, 68 wells, Orange County.

PETROLEUM MIDWAY COMPANY, LTD.,
1015 Security Bldg., Los Angeles, Cal. E. L. Doheny, President. Norman Bridge, Secretary. February 15, 1915. $10,000. Three wells, Kern County.

Petroleum North Midway Company,
1023 Crocker Bldg., San Francisco, Cal. F. W. Bradley, President, S. A. Guiberson, Jr., Secretary. April 5, 1910. $1,000,000.

Petroleum Production Company,
605 Ferguson Bldg., Los Angeles, Cal. R. A. Broomfield, President, W. C. Cushing, Secretary. March 21, 1912. $1,00,000.

Petrolia Oil Company,
Tulare, Cal. A. W. Wheeler, President. W. A. Higgins, Secretary. June 29, 1899. $50,000.

Phœnix Oil Company,
Box 416, Hanford, Cal. P. McRae, President, W. R. McQuiddy, Secretary. November 28, 1898. $250,000.

Pico Oil Company,
303 Tajo Bldg., Los Angeles, Cal. W. B. Scott, President, W. Astley, Secretary. March 26, 1909. $250,000.

Piedmont Oil Company,
Room 204, 1204 Broadway, Oakland, Cal. E. A. Heron, President, H. L. Breed, Secretary. December 17, 1900. $500,000. Kern County.

PIERPONT OIL COMPANY,
149 N. Los Angeles St., Los Angeles, Cal. Wm. Hardee, President, F. W. Black, Secretary. March 29, 1909. $500,000. Twelve wells, Kern County.

Pilot Oil Company,
607 First National Bank Bldg., San Francisco, Cal. May 9, 1908. $200,000.

PINAL DOME OIL COMPANY,
Santa Maria, Cal. J. F. Goodwin, President, Geo. P. Merritt, Secretary. June 21, 1912. $4,000,000. Nine wells, Kern County, 42 wells, Santa Barbara County.

Pioneer Midway Oil Company,
411 Montgomery St., San Francisco, Cal. I. Strassburger, President. A. E. Cole, Secretary. August 17, 1907. $1,000,000.

PIONEER MIDWAY OIL COMPANY CONS.,
Sharon Bldg., San Francisco, Cal. Wm. Sproule, President, P. G. Williams, Secretary. June 13, 1910. $2,000,000. Six wells, Kern County.

Piru Monarch Oil Company,
633 Union Oil Bldg., Los Angeles, Cal. M. P. Light, President. June 2, 1911. $1,000,000.

Piru Oil and Land Company,
305 Security Bldg., Los Angeles, Cal. W. A. Ramsey, Assistant Secretary. August 4, 1900. $300,000.

Piru Oil Company,
600 Market St., San Francisco, Cal. W. Gregg, Jr., President, W. R. Berry, Secretary. January 21, 1887. $100,000. Ventura County.

Pitcher and Garbutt Oil Company,
648 S. Olive St., Los Angeles, Cal. F. A. Garbutt, President, Samuel C. Hall, Secretary. June 25, 1900. $500,000.

Pittsburgh-Belridge Oil Company,
317 Fourth Ave., Pittsburgh, Pa. W. S. Kuhn, President, H. B. Smith, Secretary. April 12, 1912. $250,000.

Pittsburgh Pacific Oil Company,
605 Ferguson Bldg., Los Angeles, Cal. R. A. Broomfield, President. June 4, 1914. $1,000,000.

Placentia Oil Company,
522 Security Bldg., Los Angeles, Cal. S. E. Brobst, Secretary. November 4, 1914. $100,000. Orange County.

Placerita Oil Company,
119 E. Colorado St., Pasadena, Cal. F. C. Melton, President, Geo. G. McLaughlin, Secretary.

Pleasant Valley Oil Company, Ltd.,
Lost Hills, Cal. T. A. Crumpton, President, I. M. Conkey, Secretary, August 16, 1911. $15,000. Fresno County.

Pleyto Consolidated Oil Company,
333 Kearny St., San Francisco, Cal. C. W. Jackson, President, J. C. Currier, Secretary. April 15, 1912. $400,000.

Poso Creek Oil Company,
Bakersfield, Cal. S. P. Wible, Vice President, S. L. Mack, Secretary. November 22, 1899. $100,000.

Poston Oil Company,
Box 354, Santa Clara, Cal. Jas. Sutherland, President, T. A. Birge, Secretary. October 29, 1899. $30,000.

POTTER OIL COMPANY OF CALIFORNIA,
605 Ferguson Bldg., Los Angeles, Cal. Robert Law, Jr., President, J. H. Healy, Secretary. April 26, 1915. $500,000. Seventeen wells, Kern County.

Preferred Oil Company,
521 W. P. Story Bldg., Los Angeles, Cal. C. C. Spicer, President, C. F. Butler, Secretary. January 25, 1912. $20,000.

Premier Antioch Oil Company,
714 Tenth St., Oakland, Cal. S. B. Reynolds, President, A. A. Cozad, Secretary. August 19, 1911. $200,000.

PREMIER OIL COMPANY,
577 I. W. Hellman Bldg., Los Angeles, Cal. T. Spellacy, President, W. M. Wallace, Secretary. September 5, 1907. $1,000,000. Fifteen wells, Fresno County.

Price-Well Oil Company,
319 Wilcox Bldg., Los Angeles, Cal. A. D. Elwell, President, C. E. Price, Secretary. March 20, 1909. $50,000.

Princeton Oil Company,
208 Brower Bldg., Bakersfield, Cal. H. A. Jastro, President, C. A. Barlow, Secretary. January 7, 1913. $50,000. Kern County.

PRODUCERS AND CONSUMERS OIL COMPANY,
509 Wells Fargo Bldg., San Francisco, Cal. W. G. Chanslor, President, R. O'Kane, Secretary. August 13, 1895. $1,000,000. Two wells, Fresno County.

Producers Oil Company Guaranteed,
1945 Tulare St., Fresno, Cal. B. F. Shepherd, Jr., President, W. G. Cochrane, Secretary. October 25, 1899. $500,000. Kern County.

Progressive Oil Company of Coalinga,
325 Holbrook Bldg., San Francisco, Cal. C. W. Hall, President, H. C. Decker, Secretary. November 12, 1912. $1,000,000. Fresno County.

Prudential Oil Company,
1125 Hearst Bldg., San Francisco, Cal. J. F. Utter, President, M. C. Richer, Secretary. $100,000.

PROVIDENTIAL OIL COMPANY,
Room 323 Timken Bldg., San Diego, Cal. F. E. Wisecup, President, E. G. Dehm, Secretary. October 5, 1914. $1,000,000. Two wells, Orange County.

Provident Oil Mining Company,
637 Monadnock Bldg., San Francisco, Cal. Dr. A. McFadyn, President, J. C. Cullen, Secretary. November 26, 1900. $300,000. Kern County.

Puente Oil Company,
829 Title Insurance Bldg., Los Angeles, Cal. W. R. Rowland, President, W. Astley, Secretary. January 22, 1892. $2,000,000.

PURE OIL COMPANY,
514 S. Broadway, Los Angeles, Cal. J. W. Young, President. June 4, 1900. $300,000. One well, Ventura County.

Purissima Hills Oil Company,
520 Rialto Bldg., San Francisco, Cal. H. A. Broughton, President, James Casey, Secretary. October 31, 1908. $1,000,000.

PYRAMID OIL COMPANY,
716 Phelan Bldg., San Francisco, Cal. Geo. S. Johnson, President, Otto B. Johnson, Secretary. October 7, 1909. $2,000,000. Four wells, Kern County, 5 wells, Ventura County.

QUEEN OIL COMPANY,
First National Bank Bldg., Los Angeles, Cal. W. N. Hamaker, Secretary. Three wells, Fresno County.

QUINTUPLE OIL COMPANY,
339 Consolidated Realty Bldg., Los Angeles, Cal. R. J. Gaffney, President, A. E. Hurley, Secretary. July 30, 1914. $100,000. One well, Orange County.

Radium Oil Company,
410 Montgomery St., San Francisco, Cal. Charles Sutro, President, L. D. Carr, Secretary. April 29, 1904. $250,000.

Rambler Oil Company,
Bakersfield, Cal. M. V. McQuigg, President, A. J. Wallace, Secretary. June 17, 1908. $50,000.

Ramona Home Oil Company,
523 Stimson Bldg., Los Angeles, Cal. Wm. Carter, Jr., President, Joseph T. Campbell, Secretary. August 5, 1910. $500,000.

RANCHO LA BREA OIL COMPANY,
Merchants National Bank, Los Angeles, Cal. G. Allen Hancock, owner. Fifty-seven wells, Los Angeles County.

RECORD OIL COMPANY,
433 Mills Bldg., San Francisco, Cal. H. H. Hart, President, W. J. Clark, Secretary. March 3, 1905. $200,000. Eight wells, Fresno County, Kern County.

RECOVERY OIL COMPANY,
510 Crocker Bldg., San Francisco, Cal. Geo. T. Cameron, President, R. A. Morton, Secretary. December 2, 1910. $1,000,000. Four wells, Kern County.

Recruit Oil Company,
Sharon Bldg., San Francisco, Cal. Wm. Sproule, President, P. G. Williams, Secretary. May 4, 1903. $1,000,000.

Red Man Petroleum Company,
450 Monadnock Bldg., San Francisco, Cal. A. A. Cohn, President, W. J. Sterett, Secretary. October 27, 1911. $300,000.

Refining and Production Oil Company,
354 Pine St., San Francisco, Cal. T. N. Barnsdall, President, R. A. Broomfield, Secretary. May 4, 1911. $1,250,000.

Regal Oil Company,
227 Security Bldg., Los Angeles, Cal. F. E. Dunlap, President, G. C. Dennis, Secretary. September 12, 1908. $100,000.

R. E. Graham Oil Company,
Box 8, Taft, California.

Republic Oil Company,
1118 Hearst Bldg., San Francisco, Cal. S. A. Guiberson, Jr., President, B. H. Henderson, Secretary. February 2, 1910. $6,000.

Result Oil Company,
1118 Kohl Bldg., San Francisco, Cal. P. E. Bowles, President, F. W. McNear, Secretary. March 6, 1908. $25,000.

REVENUE OIL COMPANY,
410 Citizens Bank Bldg., Pasadena, Cal. R. H. Pinney, President, A. K. Nash, Secretary. March 17, 1900. $200,000. Eight wells, Kern County.

REWARD OIL COMPANY,
1118 Kohl Bldg., San Francisco, Cal. P. E. Bowles, President, F. W. McNear, Secretary. March 9, 1901. $100,000. Forty wells, Kern County.

Ricardo Oil Company,
510 Lissner Bldg., Los Angeles, Cal. Wm. Barnstow, President, Marcus B. White, Secretary. March 17, 1915. $25,000.

RICE RANCH OIL COMPANY,
710 Merchants National Bank Bldg., Los Angeles, Cal. C. J. Kubach, President, E. A. Rang, Secretary. March 14, 1904. $300,000. Twelve wells, Santa Barbara County.

Richfield Oil Company,
933 I. N. Van Nuys Bldg., Los Angeles, Cal. T. A. Winter, President, G. J. Symington, Secretary. November 29, 1911. $150,000.

Rio Bravo Oil Company,
Hollister, Cal. G. D. Clark, President, W. C. Graves, Secretary. February 14, 1900. $100,000.

Rio Oil Company,
1667 Chester Ave., Bakersfield, Cal. May 21, 1910. $100,000.

Roanoak Oil Company,
Room 3, Farmers National Bank, Fresno, Cal. Geo. L. Warlow, Secretary. December 24, 1900. $100,000.

ROCK OIL COMPANY,
1007 Washington Bldg., Los Angeles, Cal. L. C. Torrance, President, Nichols Milbank, Secretary. April 7, 1910. $5,000,000. Eight wells, Kern County.

Rosario Oil Company,
245 Holbrook Bldg., San Francisco, Cal. O. Scribner, President, G. Sheridan, Secretary. March 24, 1911. $25,000.

Rose Oil Company,
Sixth and Broadway, Los Angeles, Cal. L. W. Johnson, President, James B. Sullivan, Secretary. July 6, 1903. $200,000.

Royal Petroleum Company,
1320 Washington Bldg., Los Angeles, Cal. March 5, 1915. $200,000.

R. T. Oil Company,
Madera, Cal. W. B. Thurman, President, G. S. Thurman, Secretary. September 19, 1910. $150,000.

Ruby Oil Company,
1005 Security Bldg., Los Angeles, Cal. J. M. Danziger, President, Wilbert Morgrage, Secretary. February 3, 1908. $40,000.

Sacramento Palo Pinto Oil Company,
205 Peoples Bank Bldg., Sacramento, Cal. Clinton L. White, President. May 1, 1912. $50,000.

SAFE OIL COMPANY,
208 Brower Bldg., Bakersfield, Cal. C. A. Barlow, President, W. H. Hill, Secretary. March 1, 1907. $100,000. Four wells, Kern County.

Safety Oil Company,
Delger Bldg., Fourteenth and Broadway, Oakland, Cal. G. Erwin Brinkerhoff, President, M. V. Cooley, Secretary. March 8, 1901. $17,500.

SALT LAKE OIL COMPANY,
55 New Montgomery St., San Francisco, Cal. Wm. Sproule, President, P. G. Williams, Secretary. November 27, 1903. $500,000. One hundred nine wells, Los Angeles County.

SALT MARSH CANON OIL COMPANY,
P. O. Box 44, Santa Paula, Cal. A. M. Dunham, President, F. H. Dunham, Secretary. September 24, 1902. $50,000. Five wells, Ventura County.

SALVIA OIL COMPANY,
1011 Security Bldg., Los Angeles, Cal. T. A. O'Donnell, President, Ellis T. Yarnell, Secretary. Fourteen wells, Fresno County.

San Antonio Oil and Land Company,
348 Hayes St., San Francisco, Cal. James R. Little, President, A. W. Craig, Treasurer. March 19, 1900. $100,000.

San Bernardino Valley Oil Company,
Rialto Ave., San Bernardino, Cal. A. E. Perris, President, D. M. Perris, Secretary. December 2, 1912. $25,000.

San Carlos Oil Company,
200 McAllister St., San Francisco, Cal. H. B. Hambly, Secretary. February 19, 1892. $1,000,000.

SAN DIEGO CONSOLIDATED OIL COMPANY,
321 Timken Bldg., San Diego, Cal. P. M. Johnson, President, G. H. Hughes, Secretary. May 3, 1915. $500,000. Three wells, Orange County.

SAN FRANCISCO AND M'KITTRICK OIL COMPANY,
607 Monadnock Bldg., San Francisco, Cal. H. W. Maxfield, President, W. C. Beattie, Secretary. December 11, 1899. $500,000. Eighteen wells, Kern County.

San Francisco and Wyoming Oil Company,
67 Buena Vista Terrace, San Francisco, Cal. F. G. Baird, President, Wm. J. Drew, Secretary. August 5, 1913. $200,000.

SAN FRANCISCO MIDWAY OIL COMPANY,
660 Market St., San Francisco, Cal. Geo. F. Lyon, President, W. S. Oliver, Secretary. March 25, 1910. $500,000. One well, Kern County.

San Francisco Osage Oil and Gas Company,
1130 I. N. Van Nuys Bldg., Los Angeles, Cal. Wm. Graham, President, Chas. B. Anderson, Secretary. July 17, 1905. $1,000,000.

San Juan Oil Company,
1910 Mariposa St., Fresno, Cal. W. B. Holland, President, Ben Epstein, Secretary. March 5, 1909. $250,000.

SANTA CLARA OIL AND DEVELOPMENT COMPANY,
719 Story Bldg., Los Angeles, Cal. L. C. Throop, President, Chas A. Nelson, Secretary. February 9, 1912. $1,000,000. One well, Ventura County.

Santa Maria Crude Oil Company,
316 Bumiller Bldg., Los Angeles, Cal. W. V. Ambrose, President, W. I. Turck, Secretary. December 29, 1906. $500,000.

Santa Maria Enterprise Oil Company,
1201 Hibernia Bldg., Los Angeles, Cal. G. E. Bittinger, President, E. L. Brock, Secretary. December 15, 1909. $400,000.

Santa Maria Gas and Power Company,
Santa Maria, Cal. J. F. Gooodwin, President, R. E. Easton, Secretary.

SANTA MARIA OIL FIELDS OF CALIFORNIA, LTD.,
Santa Maria, Cal. G. Bishirgian, Attorney in fact. June 14, 1911. £1,000,000. Four wells. Santa Barbara County.

Santa Paula Oil Corporation,
435 Security Bldg., Los Angeles, Cal. Rudolph Mausard, Secretary, July 25, 1914. $500,000.

Santa Paula Y Saticoy Oil Company,
316 Kohl Bldg., San Francisco, Cal. Wm. Whitney, President, A. C. Hellmann, Secretary. March 28, 1903. $10,000.

SANTA SUSANA SYNDICATE,
1201 W. I. Hollingsworth Bldg., Los Angeles, Cal. Dr. A. Hirschi, President. Eleven wells, Ventura County.

SAUER DOUGH OIL COMPANY,
510 Crocker Bldg., San Francisco, Cal. Geo. T. Cameron, President, R. A. Morton, Secretary. January 7, 1901. $250,000. Nine wells, Fresno County.

SCARAB OIL COMPANY,
344 S. Fifth St., Oxnard, Cal. W. L. Dunn, President, H. R. Staples, Secretary. March 1, 1909. $100,000. One well, Ventura County.

Seaboard Oil and Transit Company,
607 W. P. Story Bldg., Los Angeles, Cal. C. L. Flack, President, C. A. Goodrich, Secretary. December 28, 1911. $10,000.

Sea Breeze Oil Company,
Box 246, Bakersfield, Cal. Martin Coyne, President, L. Hirshfield, Secretary. June 26, 1900. $500,000.

Seaside Oil Company,
310 Sansome St., San Francisco, Cal. Harry J. Hart, President, A. Everett Bell, Secretary. February 24, 1898. $10,000.

SECTION FIVE OIL COMPANY,
58 Sutter St., San Francisco, Cal. S. G. O. King, Secretary. December 3, 1900. $150,000. Eight wells, Kern County.

Section One Oil Company,
501 Balboa Bldg., San Francisco, Cal. T. A. O'Donnell, President, O. G. Myers, Secretary. August 14, 1907. $10,000.

SECTION SEVEN OIL COMPANY,
First National Bank Bldg., San Francisco, Cal. N. J. Brine, President, H. E. Shartley, Secretary. June 26, 1905. $300,000. Five wells, Fresno County.

Section Ten Oil Company,
343 Sansome St., San Francisco, Cal. R. A. Lewin, Secretary. May 12, 1904. $300,000. Fresno County.

Section Three Oil Company,
Madera, California. W. B. Thurman, President, G. S. Thurman, Secretary. February 23, 1911. $150,000.

SECTION TWENTY-FIVE OIL COMPANY,
208 Brower Bldg., Bakersfield, Cal. T. E. Sullivan, President, C. A. Barlow, Secretary. September 28, 1903. $40,000. Thirty wells, Kern County.

SECURITY DEVELOPMENT COMPANY,
Box 813, Bakersfield, Cal. C. H. Franey, Secretary, E. D. Burge, President. Nine wells, Kern County.

SENECA OIL COMPANY,
1133 Nielsen Ave., Fresno, Cal. Geo. L. Warlow, President, W. T. Knowles, Secretary. April 20, 1908. $250,000. Six wells, Fresno County.

SESNON OIL COMPANY,
460 Holbrook Bldg., San Francisco, Cal. W. T. Sesnon, President, Walter C. Beattie, Secretary. February 17, 1908. $100,000. Fifteen wells, Kern County.

Shandon Oil Company,
P.O. Box 400, Caldwell, N. J. Alexander Dallas, President, P. Beaton, Secretary. February 19, 1913. $750,000. Fresno County.

SHAWMUT OIL COMPANY,
697 First National Bank Bldg., San Francisco, Cal. John A. Bunting, President, A. T. Borst, Secretary. December 31, 1903. $500,000. Two wells, Fresno County.

Shaw Ranch Oil Company,
2-3 H. W. Hellman Bldg., Los Angeles, Cal. C. R. Rockwood, President, Chas. Tutschule, Secretary. September 18, 1912. $200,000.

SHEAR PETROLEUM COMPANY,
2827 La Salle Ave., Los Angeles, Cal. J. H. Purdy, President. Seven wells, Kern County.

SHELL COMPANY OF CALIFORNIA,
343 Sansome St., San Francisco, Cal. W. Meischke-Smith, President, R. A. Lewin, Secretary. July 30, 1915. $35,000,000. Eighty-three wells, Fresno County.

Shirley Oil Company,
421 N. Main St., Santa Ana, Cal. John W. Shirley, President, J. Quick, Secretary. January 7, 1903. $10,000.

Shreeves Oil Company,
Sharon Bldg., San Francisco, Cal. Wm. Sproule, President, P. G. Williams, Secretary. July 28, 1906. $200,000.

Sibyl Oil Company,
1003 Higgins Bldg., Los Angeles, Cal. J. W. Maddrill, President, C. R. Stevens, Secretary. October 11, 1909. $50,000. Kern County.

Sierra Oil Company,
First National Bank Bldg., Long Beach, Cal. Geo. L. Hoodenpyl. December 16, 1914. $75,000.

Sky Ranch Oil Company,
Moorpark, Cal. D. L. Flory, President. Geo. A. Flory, Secretary. October 25, 1912. $50,000.

South Coast Oil Company,
520 Rialto Bldg., San Francisco, Cal. James Casey, President, A. J. Porter, Secretary. July 10, 1913. $1,000,000.

Southeastern Limited Oil Company,
1241 Flood Bldg., San Francisco, Cal. Louis Nathan, President, Chas. G. Wilcox, Secretary. September 30, 1908. $500,000.

Southern California Gas Company,
805 Garland Bldg., Los Angeles, Cal. Wm. G. Kerckhoff, President, L. M. Farnham, Secretary.

Southern California Oil Syndicate, Ltd.,
Lompoc, Cal. W. J. Packard, Manager, Magnus Mowat, President, Matthew H. Adams, Secretary. London, E. C. April 23, 1907. £25,000.

Southern Humboldt Oil Company,
601 Second St., Eureka, Cal. J. S. Burnell, Secretary. July 25, 1910. $100,000.

Southfield Oil Company,
607 First National Bank Bldg., San Francisco, Cal. Robert Hays Smith, President, E. G. Camet, Auditor. May 14, 1909. $500,000.

South Midway Oil Company,
418 Chamber of Commerce Bldg., Los Angeles, Cal. Julius Fried, President, W. W. Warthing, Secretary. April 15, 1910. $1,000,000. Kern County.

South Mountain Oil Company,
346 Title Insurance Bldg., Los Angeles, Cal. R. Mansard, President, M. M. Miles, Secretary. October 20, 1913. $300,000.

SOUTH PACIFIC OIL COMPANY,
637 Consolidated Realty Bldg., Los Angeles, Cal. A. I. Smith, Secretary. Eleven wells, Ventura County.

SOVEREIGN OIL COMPANY,
585 Market St., San Francisco, Cal. William Ellery, President, J. W. Ellery, Secretary. October 15, 1900. $500,000. Ten wells, Kern County.

SPINKS CRUDE OIL COMPANY,
Monrovia, Cal. William A. Spinks, President, Walter F. Dunn, Secretary. November 3, 1909. $200,000. Seven wells, Fresno County.

S. P. Placer Mining Company,
Bakersfield, Cal. M. A. Lindberg, President, Fred Gunther, Secretary. September 8, 1899. $200,000.

SPRECKELS OIL COMPANY,
100 Davis St., San Francisco, Cal. John D. Spreckels, Jr., President, G. B. Waterman, Secretary. November 1, 1911. $200,000. Four wells, Kern County.

Squaw Flat Oil Company,
401 Union Oil Bldg., Los Angeles, Cal. A. J. Aber, President, B. W. Howe, Secretary. August 11, 1910. $200,000.

STANDARD OIL COMPANY,
Standard Oil Bldg., San Francisco, Cal. D. G. Scofield, President, H. M. Story, Secretary. September 10, 1879. $100,000,000. Eighty-five wells, Fresno County, 260 wells, Kern County, 102 wells, Los Angeles, Cal., 33 wells, Orange County.

Star Oil Company,
350 Mills Bldg., San Francisco, Cal. J. J. Mack, President, S. L. Mack, Secretary. September 25, 1899. $500,000.

STATE CONSOLIDATED OIL COMPANY,
915 Baker-Detwiler Bldg., Los Angeles, Cal. E. J. Miley, President, A. M. Burley, Secretary. March 3, 1911. $1,250,000. Twenty-seven wells, Kern County.

State Oil Company of California.
1208 Alaska Commercial Bldg., San Francisco, Cal. John Barneson, President, W. J. Dinsmore, Secretary. February 15, 1910. $2,000,000. Kern County.

STAUFFER OIL COMPANY,
624 California St., San Francisco, Cal. C. de Guigne, President, C. Jantzen, Secretary. May 19, 1909. $100,000. Six wells, Kern County.

STERLING OIL AND DEVELOPMENT COMPANY,
Sharon Bldg., San Francisco, Cal. R. P. Schwerin, President, P. G. Williams, Secretary. October 30, 1899. $250,000. Forty-one wells, Kern County.

ST. HELENS PETROLEUM COMPANY LTD.,
Los Angeles Investment Building, Los Angeles, Cal. H. H. Haldin, London, Eng., R. H. Young, London, Eng. May 10, 1913. £70,500. Twelve wells, Kern County, 14 wells, Orange County.

ST. LAWRENCE OIL COMPANY,
411 Montgomery St., San Francisco, Cal. I. Strassberger, President, A. E. Cole, Secretary. April 14, 1908. $100,000. Seven wells, Kern County.

STOCKTON MIDWAY OIL COMPANY,
309 E. Main St., Stockton, Cal. G. F. Hudson, President, C. F. Campbell, Secretary. December 8, 1910. $1,000,000. Five wells, Kern County.

Stockton, San Juan Oil Company,
632 E. Main St., Stockton, Cal. May 4, 1911. $25,000.

ST. PAUL CONSOLIDATED OIL COMPANY,
3 Farmers National Bank Bldg., Fresno, Cal. Geo. L. Warlow, President, W. T. Knowles, Secretary. September 24, 1910. $600,000. Eleven wells, Fresno County.

St. Paul Fresno Oil Company,
3 Farmers National Bank Bldg., Fresno, Cal. Geo. L. Warlow, President, W. T. Knowles, Secretary. June 5, 1903. $250,000.

STRONG OIL COMPANY,
1015 Marsh-Strong Bldg., Los Angeles, Cal. Four wells, Fresno County.

Sturgeon Oil Company,
Santa Ana, Cal. J. A. Turner, President, I. D. Mills, Secretary. January 11, 1901. $300,000. Kern County.

Submarine Oil Company,
809 Hollingsworth Bldg., Los Angeles, Cal. W. C. Price, President, G. G. Lawrence, Secretary.

SUCCESSUS OIL COMPANY,
Box 566, Bakersfield, Cal. Louis V. Olcese, President, Gus Shamblin, Secretary. October 6, 1911. $150,000. One well, Kern County.

Sudden Oil Company,
Lompoc, Cal. T. F. Fox, President, John C. Lind, Secretary. March 5, 1910. $300,000.

Sulphur Mountain Petroleum Company,
Fullerton, Cal. Wm. Starbuck, President, W. R. Collins, Secretary. July 13, 1900. $800,000.

Sulphur Range Oil Company,
Ventura, Cal. Jas. S. Blackstock, Secretary. E. W. Carne, Treasurer. June 8, 1900. $100,000.

Sunpark Oil Company,
1130 Van Nuys Bldg., Los Angeles, Cal. Burton E. Green, President, F. B. Sutton, Secretary. December 19, 1910. $100,000.

Sunset Extension Oil Company,
Room 801, Garland Bldg., Los Angeles, Cal. Harry M. Wier, President, Geo. E. Mills, Secretary. May 23, 1910. $300,000. Kern County.

SUNSET MONARCH OIL COMPANY,
60 California St., San Francisco, Cal. G. P. Ayers, President, Geo. A. Douglas, Secretary. December 10, 1906. $500,000. Thirty-three wells, Kern County.

Sunset Oil Company.
Santa Barbara, Cal. F. A. Conant, President, J. C. Hassinger, Secretary. June 21, 1899. $50,000. Kern County.

Sunset Oil Company,
820 H. W. Hellman Bldg., Los Angeles, Cal. W. S. James, Secretary. July 11, 1890. $1,000,000.

Sunset Road Oil Company,
417 Crocker Bldg., San Francisco, Cal.

Sunset Security Oil Company,
Brower Bldg., Bakersfield, Cal. J. C. Payne, President, C. A. Barlow, Secretary. March 5, 1909. $500,000.

Sunshine Oil Company,
Woodland, Cal. J. M. Day, President, D. M. Speed, Secretary. July 15, 1910, $150,000.

Surf Oil Company,
1114 Union Oil Building, Los Angeles, Cal. W. L. Stewart, President, Giles Kellogg, Secretary. December 19, 1902. $500,000.

Sussex Oil Company,
Room 411, 332 Pine St., San Francisco, Cal. F. E. Fitzpatrick, President, Edward Fox, Secretary. November 11, 1910. $350,000.

S. W. AND B. OIL COMPANY,
622 Merchants Exchange Bldg., San Francisco, Cal. A. D. King, Vice President, Robt. Belcher, Secretary, March 23, 1904. $400,000. Five wells, Fresno County.

Swan Oil Company,
Visalia, Cal. A. Levis, Vice President, H. Jerusalem, Secretary. January 8, 1900. $15,000.

Syndicate Oil Company,
San Luis Obispo, Cal. E. W. Clark, President, Paul M. Gregg, Secretary. March 18, 1905. $250,000.

TAMALPIAS OIL COMPANY,
149 California St., San Francisco, Cal. E. A. Bunker, President, B. F. Bostwick, Secretary. March 31, 1910. $500,000. Three wells, Kern County.

Tannehill Oil Company,
1815 Cherokee Ave., Los Angeles, Cal. L. B. Tannehill, President, C. C. Tannehill, Secretary. February 4, 1909. $250,000.

Tapo Oil Company,
103 W. Main St., Santa Paula, Cal. S. C. Graham, President, Allen C. McKevett, Secretary. April 27, 1900. $1,000,000.

TEJON OIL COMPANY,
P.O. Box 211, Bakersfield, Cal. H. R. Peacock, President, P. McCart, Secretary. November 9, 1908. $20,000. Two wells, Kern County.

Temple Oil Company,
303 Security Bldg., Los Angeles, Cal. Jas. Cuzner, President, F. S. Hicks, Secretary. July 30, 1892. $60,000.

Tepusquet Oil Company,
Box 554, Ardmore, Oklahoma. T. J. Myler, President, Henry S. Livingstone, Secretary. $350,000.

Texas Oklahoma Oil Company,
Hibernian Bank Bldg., San Francisco, Cal. Nettie C. McIntyre, Secretary. August 14, 1914. $100,000.

Theta Oil and Land Company,
260 California St., San Francisco, Cal. D. Y. Campbell, President, W. C. de Fremery, Secretary. February 20, 1900. $48,380.

36 Oil Company,
3 Farmers National Bank Bldg., Fresno, Cal. Geo. L. Warlow, Secretary. December 24, 1900. $500,000.

Thirty Thirty-Two Land Company,
1004 Security Bldg., Los Angeles, Cal. J. M. Danziger, President, Geo. L. Reynolds, Secretary. December 8, 1910. $1,500,000.

32 Oil Company,
836 H. W. Hellman Bldg., Los Angeles, Cal. W. C. Price, President, W. R. Wheat, Secretary. December 4, 1908. $10,000.

Three Counties Oil Company,
Room 411, 332 Pine St., San Francisco, Cal. January 27, 1903. $1,000,000.

Three Twenty Oil Company,
101 Edgerly Bldg., Fresno, Cal. M. R. Madary, Vice President, F. S. Story, Secretary. March 23, 1910. $500,000.

Tia Juana Valley Oil Company,
323 Timken Bldg., San Diego, Cal. John F. Scott, President, A. J. Razeto, Secretary. September 16, 1910. $70,000. San Diego County.

Tidal Wave Oil Company,
Selma, Cal. T. B. Matthews, Vice President, G. W. Glines, Secretary. July 22, 1899. $25,000.

Titicaca Oil Company,
1130 I. N. Van Nuys Bldg., Los Angeles, Cal. Chester W. Brown, President, Chas. B. Anderson, Secretary. May 11, 1905. $1,000,000.

TOPAZ OIL COMPANY,
Box 34, Bakersfield, Cal. A. J. Woody, President, T. M. Young, Secretary. June 25, 1908. $20,000. Two wells, Kern County.

Top Knot Oil Company,
421 N. Main St., Santa Ana, Cal. A. J. Visel, Secretary. October 5, 1900. $200,000. Kern County.

Torrey Cañon Oil Company,
1232 Merchants Exchange Bldg., San Francisco, Cal. C. B. Wingate, President, G. M. Murphy, Secretary. July 1, 1910. $200,000.

Tower Oil and Development Company,
35 W. Santa Clara St., San Jose, Cal. H. C. Pfister, Secretary. August 18, 1911. $25,000.

Towsley Cañon Oil Company,
752 S. Broadway, Los Angeles, Cal. J. D. Caplin, President, J. H. Borders, Secretary. July 16, 1915. $25,000.

TRADERS OIL COMPANY,
622 Union Oil Company Bldg., Los Angeles, Cal. M. V. McQuigg, President, A. J. Wallace, Secretary. July 13, 1907. $1,500,000. Twenty-five wells, Fresno County, 25 wells, Kern County.

TRAFFIC OIL COMPANY,
622 Union Oil Bldg., Los Angeles, Cal. M. V. McQuigg, President, A. J. Wallace, Secretary. April 12, 1910. $2,500,000. Fourteen wells, Kern County.

Tres Sierrotas Oil and M. Company,
Lemoore, Cal. J. H. McGlashan, President, E. P. Ammerman, Secretary. October, 1899. $60,000.

Tri-State Oil Company,
944 Title Insurance Bldg., Los Angeles, Cal. Fred G. Philipps, President, Ernest B. Coie, Secretary. March 13, 1912. $500,000.

Triune Oil Company,
230 California St., San Francisco, Cal. Jas. Rolph, Jr., President, C. P. Chamberlain, Secretary. April 7, 1910. $150,000.

TROJAN OIL COMPANY,
401 Union Oil Bldg., Los Angeles, Cal. A. J. Aber, President, B. M. Howe, Secretary. May 19, 1914. $500,000. One well, Kern County.

Tulare Oil and Mining Company,
115 N. K St., Tulare, Cal. L. E. Schoenemann, President, C. W. Cobb, Secretary. November 1, 1890. $300,000.

TUMBADOR OIL COMPANY,
501 Crocker Bldg., San Francisco, Cal. W. F. Williamson, President, E. M. Eddy, Secretary. May 5, 1910. $500,000. Five wells, Kern County.

Turner Oil Company,
1006 California Bldg., Los Angeles, Cal. G. J. Syminton, Secretary, G. L. Holton, President. June 14, 1899. $150,000. Los Angeles County.

Turner Oil Company,
Room 306, 180 Sutter St., San Francisco, Cal. Frank Pauson, President, J. W. Pauson, Secretary. November 5, 1904. $50,000. Fresno County.

Twentieth Century Oil Company,
1927 Mariposa St., Fresno, Cal. W. O. Miles, Secretary. October 25, 1900. $200,000.

Twenty-four Oil Company,
1017 J St., Fresno, Cal. Geo. Kaehler, President, A. C. Ruschhaupt, Secretary. December 1, 1909. $24,000.

Twenty-two Oil Company,
6, 7, 8 Fisk Bldg., Fresno, Cal. March 18, 1905.

Twin Cities Oil Company,
Citizens Bank, Nevada City, Cal. C. E. Clinch, President, D. E. Morgan, Secretary. May 20, 1901. $250,000.

T. W. OIL COMPANY,
Box 34, Bakersfield, Cal. T. M. Young, President, G. R. Peckham, Secretary. March 12, 1909. $100,000. Five wells, Kern County.

Uintah Development Company,
1206 Broadway, Oakland, Cal. September 10, 1910. $1,000,000.

Union Annex Oil Company,
Union Oil Building, Los Angeles, Cal. J. S. Torrance, President, Giles Kellogg, Secretary. February 24, 1903. $1,000,000.

Union Kern Oil Company,
545 I. W. Hellman Bldg., Los Angeles, Cal. G. C. Gove, Secretary, F. C. Carlsen, President. July 30, 1910. $1,000,000.

UNITED CRUDE OIL COMPANY,
1614 Nineteenth St., Bakersfield, Cal. P. C. Makson, President, C. H. Burdeck, Secretary. August 16, 1908. $500,000. Three wells, Kern County.

UNION OIL COMPANY OF CALIFORNIA,
Union Oil Bldg., Los Angeles, Cal. W. L. Stewart, President, Giles Kellogg, Secretary. October 17, 1890. $50,000,000. Eighteen wells, Fresno County, 18 wells, Kern County, 61 wells, Orange County, 88 wells, Ventura County, 116 wells, Santa Barbara County.

United Development Company,
193 E. E St., Coalinga, Cal. O. D. Loftus, Vice President, Guy H. Salisbury, Secretary. September 21, 1909. $45,000.

United Midway Oil Land Company,
J. B. Newman, President, C. E. Groat, Secretary. 1234 Fifth St., Santa Monica, Cal. March 5, 1910. $100,000.

UNITED OIL COMPANY,
Investment Bldg., Los Angeles, Cal. C. F. Whittier, President, J. S. Wallace, Secretary. November 19, 1909. $2,000,000. Nine wells, Kern County.

United Petroleum Company,
1114 Union Oil Bldg., Los Angeles, Cal. Lyman Stewart, President, Giles Kellogg, Secretary. January 25, 1899. $10,000,000.

U. S. Oil and Mining Company,
Box 246, Bakersfield, Cal. Martin Coyne, President, L. Hirshfield, Secretary. December 23, 1899. $300,000.

U. S. Oil Ref. and Producing Company,
608 Crocker Bldg., San Francisco, Cal. J. C. Kemp van Ee, President, P. F. Unger, Secretary. January 27, 1910. $1,000,000.

UNIVERSAL OIL COMPANY,
510 Crocker Bldg., San Francisco, Cal. R. N. Bishop, President, R. A. Morton, Secretary. April 27, 1911. $6,000,000. Forty-six wells, Kern County.

Utopian Oil Company,
2700 Budlong Ave., Los Angeles, Cal. Adolph Herman, President. December 21, 1914. $50,000.

Valley Oil Company,
Webb Bldg., Coalinga, Cal. Thos. P. Smith, President, J. A. Fluetsch, Secretary. February 18, 1909. $100,000.

Valvoline Oil Company,
440 Brannan St., San Francisco, Cal. T. J. Finch, Manager. June 21, 1904. $1,500,000.

Vancouver Midway Oil Company,
1206 Alaska Commercial Bldg., San Francisco, Cal. A. L. Weil, President, M. Syme, Secretary. January 10, 1911. $100,000. Kern County.

Vanderlip Oil Company,
Care Fox and Garrett Oil Company, Bakersfield, Cal. Geo. A. Edgar, President, H. C. Vanderlip, Secretary. February 16, 1901. $200,000. Kern County.

Ventura Oil Lands Company,
Insurance Exchange Bldg., San Francisco, Cal. R. K. Barrows, President, A. E. Boynton, Secretary. July 21, 1911. $2,000,000.

VENTURA PACIFIC OIL COMPANY,
323 Timken Bldg., San Diego, Cal. F. E. Wisecup, President, E. G. Dehm, Secretary. October 18, 1912. $225,000. Five wells, Ventura County.

Vera Cruz Oil Company,
607 Story Bldg., Los Angeles, Cal. William Perry, President, C. A. Goodrich, Secretary.

Veratina Oil Company,
348 Hayes St., San Francisco, Cal. C. W. Jackson, President, A. W. Craig, Secretary. February 27, 1901. $150,000.

VESTA OIL COMPANY,
408 Consolidated Realty Bldg., Los Angeles, Cal. Geo. F. Freeman, President, L. Schenck, Secretary. August 7, 1900. $300,000. Eleven wells, Kern County.

Victoria Oil Company,
Fourth St. and Second Ave., Minneapolis, Minn. Chas. Murray, President, Edwin J. Murray, Secretary. November 30, 1914. $50,000.

VICTOR OIL COMPANY,
1109 Van Nuys Bldg., Los Angeles, Cal. H. D. Colson, President, Frank C. Winter, Secretary. March 30, 1910. $500,000. Four wells, Kern County.

VIRGINIA OIL COMPANY,
Box 655, Los Angeles, Cal. John M. Sands, President, J. B. Kissinger, Secretary. May 26, 1914. $25,000. Fourteen wells, Kern County.

VISALIA MIDWAY OIL COMPANY,
110 S. Court St., Visalia, Cal. E. L. Smith, President, Geo. D. Smith, Secretary. March 9, 1901. $500,000. Four wells, Kern County.

Visalia Oil Company,
Visalia, Cal. Louis Lucier, President, Otto Luhdorff, Secretary. April 13, 1914. $100,000. Kern County.

Vishnu Oil Company,
600 Market St., San Francisco, Cal. W. Gregg, Jr., President, W. R. Berry, Secretary. June 20, 1900. $500,000.

VOLCAN OIL AND REF. COMPANY,
First and I Sts., San Diego, Cal. C. H. Wagner, President, C. F. Nolan, Secretary. January 24, 1902. $550,000. Seven wells, Kern County.

VULCAN OIL COMPANY,
510 Crocker Bldg., San Francisco, Cal. Geo. T. Cameron, President, R. A. Morton, Secretary. November 17, 1911. $250,000. Ten wells, Kern County.

Wabash Oil Company,
1208 Alaska Commercial Bldg., San Francisco, Cal. John Barneson, President, W. J. Dinsmore, Secretary. April 14, 1903. $15,000.

Walker Brand Oil Company,
2827 La Salle Ave., Los Angeles, Cal. J. H. Perdy, Secretary. April 22, 1912. $100,000.

W. and S. Oil Company,
501 Crocker Bldg., San Francisco, Cal. W. F. Williamson, President, D. E. Gunn, Secretary. May 19, 1911. $200,000.

WARD OIL COMPANY,
3 Farmers National Bank Bldg., Fresno, Cal. Jas. A. Ward, President, Geo. L. Warlow, Secretary. November 15, 1907. $100,000. Eight wells, Fresno County.

Washington Oil Company,
214 Delta Bldg., Los Angeles, Cal. April 13, 1912. $100,000.

WATSONVILLE OIL COMPANY,
335 Main St., Watsonville, Cal. M. B. Tuttle, President, A. W. Cox, Secretary. December 15, 1896. $200,000. Six wells, Santa Clara County.

Welcome Oil Company,
1215 First Ave., Oakland, Cal. October 14, 1909. $200,000.

Wellman Oil Company,
309 W. I. Hollingsworth Bldg., Los Angeles, Cal. W. C. Price, President, G. G. Lawrence, Secretary. March 18, 1909. $100,000.

WENONAH OIL COMPANY,
501 Crocker Bldg., San Francisco, Cal. W. F. Williamson, President, E. M. Eddy, Secretary. March 15, 1911. $650,000. Six wells, Kern County.

West American Oil Company,
474 N. First St., San Jose, Cal. S. W. Waterhouse, President, Annie C. Waterhouse, Secretary. September 2, 1914. $25,000.

WEST COAST OIL COMPANY,
Sharon Bldg., San Francisco, Cal. Wm. Sproule, President, P. G. Williams, Secretary. June 23, 1908. $5,000,000. Sixteen wells, Los Angeles County, 46 wells, Orange County.

Western Minerals Company,
704 West Coast Life Bldg., San Francisco, Cal. H. L. Tevis, President, F. G. Dunn, Secretary. December 14, 1899. $100,000.

Western Oil Company,
1030 Black Bldg., Los Angeles, Cal. F. P. W. Hill, President, G. Zuman, Secretary. April 15, 1912. $10,000.

WESTERN UNION OIL COMPANY,
401 Bradbury Bldg., Los Angeles, Cal. C. P. Bagg, President, Morris Albee, Secretary. April 19, 1900. $1,000,000. Thirty-nine wells, Santa Barbara County.

WEST HUASNA OIL COMPANY,
Orcutt, Cal. J. F. Forbes, President, A. Mailloux, Secretary. One well, Ventura County.

West Oil Company,
1028 Chorro St., San Luis Obispo, Cal. T. A. Norton, President, P. A. Arata, Secretary. October 13, 1908. $500,000.

Westside Oil Company,
836 H. W. Hellman Bldg., Los Angeles, Cal. Geo. W. Walker, President, W. R. Wheat, Secretary. December 7, 1908. $100,000.

West Slope Oil Company,
Visalia, Cal. C. J. Giddings, President, J. Sub Johnson, Secretary. June 1, 1911. $1,000,000.

White Rock Petroleum Company,
450 Monadnock Bldg., San Francisco, Cal. W. I. Sterett, President, A. A. Cohn, Secretary. November 18, 1911. $300,000.

WHITE STAR OIL COMPANY,
1322 Washington Bldg., Los Angeles, Cal. Richard Arenz, President, Chas. E. Putnam, Secretary. February 8, 1909. $1,000,000. Nine wells, Ventura County.

Whittier Consolidated Oil Company,
1011 Security Bldg., Los Angeles, Cal. T. A. O'Donnell, President, Ellis T. Yarnell, Secretary. June 7, 1900. $1,000,000.

WHITTIER CRUDE OIL COMPANY,
P.O. Box 697 Los Angeles, Cal. L. D. Sale, President, H. G. A. Lovell, Secretary. January 22, 1900. $300,000. Seven wells, Los Angeles, Cal.

Whittier Oil and Development Company,
104 W. Philadelphia St., Whittier, Cal. C. W. Clayton, President, G. W. Barton, Secretary. May 31, 1900. $250,000.

WILBERT OIL COMPANY,
1704 Nineteenth St., Bakersfield, Cal. H. A. Jastro, President, F. G. Munzer, Secretary. September 18, 1907. $125,000. Eight wells, Kern County.

Wilcox Oil Company,
Room 637 58 Sutter St., San Francisco, Cal. Chas. G. Wilcox, President, A. N. Baldwin, Secretary. February 21, 1911. $1,000,000.

Wilson Oil Company,
836 H. W. Hellman Bldg., Los Angeles, Cal. Jas. A. Gibson, President, W. R. Wheat, Secretary. January 17, 1900. $12,500. Kern County.

Wilkes Head Oil Company,
1508 Hobart Bldg., San Francisco, Cal. Thos. Wilkes, President, A. B. Kast, Secretary. November 3, 1913. $300,000.

WINNIPEG OIL COMPANY,
905 Chestnut St., Long Beach, Cal. Wm. Grundy, President, C. F. Grundy, Secretary. January 5, 1912. $500,000. 3 wells, Ventura County.

W. J. Oil Company,
Bakersfield, Cal. S. P. Wible, President, E. F. Coons, Secretary. October 23, 1908. $25,000. Kern County.

W. K. Oil Company,
Room 306, 180 Sutter St., San Francisco, Cal. John Hinkle, President, J. W. Panson, Secretary. December 8, 1904, $250,000. Fresno County.

W. M. AND M. COMPANY,
203 Edgerly Bldg., Fresno, Cal. M. L. Woy, President, D. C. Sample, Secretary. November 17, 1909. $100,000. Four wells, Fresno County.

W. T. M. OIL COMPANY,
Box 34, Bakersfield, Cal. T. M. Young, President, G. R. Peckham, Secretary. April 19, 1909. $500,000. Five wells, Kern County.

Wyoming Consolidated Oil Company,
73 Chamber of Commerce Bldg., Pasadena, Cal. C. W. Leighton, President, A. L. Twamble, Secretary. July 18, 1912. $3,000,000.

YELLOWSTONE OIL COMPANY,
832 Van Nuys Bldg., Los Angeles, Cal. J. H. Collier, President, Ira L. Vance, Secretary. July 10, 1907. $1,000,000. Six wells, Kern County.

Yorba Oil Company,
408 Consolidated Realty Bldg., Los Angeles, Cal. F. M. Selby, President, J. E. Wallis, Secretary. May 29, 1914. $75,000. Orange County

YORK COALINGA OIL COMPANY,
607 First National Bank Bldg., San Francisco, Cal. Robert Hays Smith, President. April 30, 1902. $300,000. Three wells, Fresno County.

Yosemite Oil Company,
414 Oakland Bank Bldg., Oakland, Cal. W. E. Beck, President, O. E. Hotchkiss, Secretary. October 7, 1899. $10,000.

Yosemite Oil Refining Company,
933 Van Nuys Bldg., Los Angeles, Cal. J. A. Brower, President, G. I. Syminton, Secretary. April 21, 1915. $50,000.

Zaca Oil Company,
Santa Maria, Cal. J. B. Bonetti, President, R. E. Easton, Secretary. May 9, 1908. $500,000.

ZENITH OIL COMPANY,
816 Story Bldg., Los Angeles, Cal. Edward Strasburg, President, A. F. Schiffman, Secretary. April 20, 1900. $300,000. Three wells, Los Angeles, Cal.

Zier Oil Company,
1002 Crocker Bldg., San Francisco, Cal. Wm. L. McGuire, President, C. H. Holbrook, Jr., Secretary. April 5, 1905. $100,000.

APPENDIX.

PUBLICATIONS OF THE CALIFORNIA STATE MINING BUREAU.

Publications of this Bureau will be sent on receipt of the requisite amount. Only stamps, coin or money orders will be accepted in payment.

Money orders should be made payable to the STATE MINING BUREAU.

Personal checks will not be accepted.

REPORTS.

Asterisk (*) indicates the publication is out of print.

		Price.
*Report I.	Henry G. Hanks. 1880.	
*Report II.	Henry G. Hanks. 1882.	
*Report III.	Henry G. Hanks. 1883.	
*Report IV.	Henry G. Hanks. 1884.	
*Report V.	Henry G. Hanks. 1885.	
*Report VI.	Part 1. Henry G. Hanks. 1886.	
*Report VI.	Part 2. Wm. Irelan, Jr. 1886.	
*Report VII.	Wm. Irelan, Jr. 1887.	
*Report VIII.	Wm. Irelan, Jr. 1888.	
*Report IX.	Wm. Irelan, Jr. 1889.	
*Report X.	Wm. Irelan, Jr. 1890.	
Report XI.	Wm. Irelan, Jr. 1892. (First biennial)	$1.00
*Report XII.	J. J. Crawford. 1894. (Second biennial)	----
*Report XIII.	J. J. Crawford. 1896. (Third biennial)	----
Chapters of State Mineralogist's Report, Fletcher Hamilton:		
	Mines and Mineral Resources of Imperial and San Diego Counties—F. J. H. Merrill 1914	.35
	Mines and Mineral Resources, Amador, Calaveras and Tuolumne Counties—W. B. Tucker. 1915	.50
	Mines and Mineral Resources, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma and Yolo Counties—Walter W. Bradley. 1915	.50
	Mines and Mineral Resources, Del Norte, Humboldt and Mendocino Counties—F. L. Lowell. 1915	.25
	Mines and Mineral Resources, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin and Stanislaus Counties—Walter W. Bradley, G. C. Brown, F. L. Lowell and R. P. McLaughlin. 1915	.50
	Mines and Mineral Resources, Shasta, Siskiyou and Trinity Counties—G. C. Brown. 1915	.50
Report XIV.	Fletcher Hamilton. 1915. (The above county chapters combined in a single volume)	†

BULLETINS.

*Bulletin 1.	Desiccated Human Remains.—Winslow Anderson. 1888	----
*Bulletin 2.	Methods of Mine Timbering.—W. H. Storms. 1894	----
*Bulletin 3.	Gas and Petroleum Yielding Formations of the Central Valley of California.—W. L. Watts. 1894	----
*Bulletin 4.	Catalogue of California Fossils (Parts 2, 3, 4 and 5).—J. G. Cooper. 1894	----
*Bulletin 5.	The Cyanide Process: Its Practical Application and Economical Results.—A. Scheidel. 1894	----
Bulletin 6.	California Gold Mill Practices.—E. B. Preston. 1895	.50
*Bulletin 7.	Mineral Production of California, by Counties, 1894.—Chas. G. Yale. (Tabulated sheet)	----
*Bulletin 8.	Mineral Production of California, by Counties, 1895.—Chas. G. Yale. (Tabulated sheet)	----
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*Bulletin 10.	A Bibliography Relating to the Geology, Palæontology, and Mineral Resources of California.—A. W. Vogdes. 1896	----
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Samples (limited to three at one time) of any mineral found in the state may be sent to the Bureau for identification, and the same will be classified free of charge. No samples will be determined if received from points outside the state. It must be understood that no assays, or quantitative determinations will be made. Samples should be in lump form if possible, and marked plainly with name of sender on outside of package, etc. No samples will be received unless delivery charges are prepaid. A letter should accompany sample, giving locality where mineral was found and the nature of the information desired.

February, 1917.

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Seventeenth Biennial Report

OF THE

Bureau of Labor Statistics

OF THE

State of California

1915-1916

JOHN P. McLAUGHLIN, Commissioner
948 Market Street, San Francisco

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO
1916

27330

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†Women's Department.

LETTER OF TRANSMITTAL.

STATE BUREAU OF LABOR STATISTICS,
SAN FRANCISCO, December 14, 1916.

His Excellency, HIRAM W. JOHNSON,
Governor of California.

SIR: I have the honor to submit the Seventeenth Biennial Report of the Bureau.

Respectfully,

JOHN P. McLAUGHLIN,
Commissioner.

ACKNOWLEDGMENT.

I desire to express my appreciation to the employers who have cooperated with this bureau, to the public officials who have assisted us in carrying out our work, and to my staff, who have rendered efficient services.

JOHN P. McLAUGHLIN,
Commissioner.

INTRODUCTION.

At the close of the past fiscal year the bureau rounded out a little over five years' work under the present administration. During this time the bureau has been raised from a practically unknown and useless institution—although established in 1883—to a useful and important department of the state, commanding the respect and attention of the employers and the public at large. Offices are now maintained in the cities of San Francisco, Los Angeles, Sacramento and San Diego. Our aim has been to see that the men and women who toil should be protected in their rights and that simple justice should be accorded to them.

The results of our work have been most gratifying. We started out to make the bureau a department of service to the public, and we believe that a careful examination of the resumé that follows will show that we have gone a long way in that direction.

The bureau has come to be looked upon as a poor man's court, where the unfortunate toiler without means may secure speedy redress without the expense and "red tape" of the courts. It has also served as an effective medium in the adjustment of many of the irritating disputes that arise in the industrial field, to the benefit of both the employer and the employee. By constant vigilance, it has forced the employer to realize that the labor laws of this state can not be evaded with impunity.

That such an institution as this is a public necessity can no longer be debated. The only question is to provide adequate legislation and the necessary machinery to carry on and extend the work. It is to be hoped that the legislature will make ample provision to carry on a work of such vital importance to the welfare of the workingmen and women of this state.

During last year this department inaugurated the system of free public employment bureaus, with offices in San Francisco, Los Angeles, Oakland and Sacramento. In spite of the adverse criticism surrounding this undertaking by this department, the public employment bureaus have proved to be a wonderful success and are today considered by many as the most efficient in the United States. In the short space of less than nine months since their inception, the public employment bureaus have obtained positions for 38,850 persons, thereby saving to these persons at least $80,000, which they would have had to pay in fees to private employment agencies. At the present rate and with the present limited number of offices, the public employment bureaus will save to the toilers of this state over $250,000 within the space of two years. Although in existence only nine months, the four offices conducted by the state have filled 38,850 positions, while the entire 221 private agencies throughout the state have filled but 153,820 positions in the entire year 1915-16. In other words, the state is now doing almost one-fourth of the business formerly done by private agencies.

The bureau brought about the regulation of private employment agencies, and, between the drastic regulations now in force and the competition of the public employment bureaus, the number of private agencies has been greatly reduced.

The vicious practices formerly perpetrated on the unfortunate persons seeking employment have been wiped out, and the private agents are today compelled to make restitution to any persons suffering losses through their misrepresentation.

During the past five years 3,749 complaints against private agencies have been investigated by the bureau, and $9,061.79 has been ordered returned to the complainants. These figures, however, do not show the real effectiveness of the bureau, as most of the private agents now endeavor to adjust the complaints before they reach the bureau.

Our records show that during the past year private agencies returned to applicants who did not obtain employment, or to whom conditions were misrepresented, the sum of $112,020.40, little of which amount would have been refunded were it not for the work of the bureau.

The collection of wages, started by the bureau in 1911, has continued to be one of the most important of its functions. This work was voluntarily undertaken by the bureau upon discovering the need of some place where persons who were unable to obtain their wages could secure assistance. In five years the bureau has received 32,289 claims and has succeeded in collecting $504,744.63 for the claimants. During the past year alone 10,167 claims were handled and $179,132.22 in wages collected.

The work of supervising the payment of wages to employees engaged in seasonal labor was initiated by the bureau in 1913, and the examiners of the bureau have secured to employees sent each season to work in the salmon canneries of Alaska over $250,000 annually for the past four years. In former years these unfortunate toilers were fleeced of most of their earnings by almost every trick and device known to the sharks who prey upon the defenseless.

The bureau has continued in its work of enforcing the labor laws of the state, particularly those relating to women and children. During the past five years the bureau has investigated 41,728 complaints for violation of the labor laws, and during the past year alone 12,336 complaints were investigated.

The mere enacting of labor laws accomplishes but little good. There must be developed in the minds of the public a regard or respect for such laws, that will prevent them from becoming mere ornaments on the statute books or models for academic discussion. This condition can only be brought about by constant vigilance and by the enforcement of such laws by persons who have a sincerity of purpose and are in sympathy with their work. The record of the work performed by this bureau during the past five years speaks for itself. While all of our labor laws are not models of perfection, they have, however, through the efforts of the bureau, been made realities.

No small part of the work of the bureau during the present administration has been to investigate conditions surrounding industry, and to propose and further the passage of laws seeking to remedy or correct those conditions which were detrimental to the welfare of the toiler.

Several of the important labor laws of the state have been proposed by this department. Many important laws affecting the sanitation of camps, the collection of hospital fees and the safety and welfare of employees in industry, while not under the jurisdiction of the bureau, were nevertheless the outgrowth of the investigations and recommendations by the bureau.

In addition, the bureau has maintained its department of inspections and statistics. It was obliged, however, to forego special investigations and reports on important industries owing to lack of funds.

In Part I of the report is a review of some of the more important functions and accomplishments of the bureau, together with its recommendations.

In Part II is presented the report on the work of the public employment bureaus.

Part III is devoted to statistics of manufactures of organized labor.

Record of Complaints Filed With Bureau and Investigated.

Fiscal year ending June 30th	Total complaints filed
1916	12,366
1915	11,448
1914	9,621
1913	4,957
1912	3,336
Total	41,728

Disposition of Claims Filed for Nonpayment of Wages.

Fiscal year ending June 30th	Claims filed	Claims collected	Amount of wages collected
1916	10,167	5,672	$179,132 22
1915	9,320	5,249	153,804 20
1914	7,330	4,904	110,911 93
1913	3,573	2,213	36,450 69
1912	1,899	1,292	24,445 59
Totals	32,289	19,330	$504,744 63

Disposition of Claims Filed Against Employment Agencies.

Fiscal year ending June 30th	Complaints filed	Fees and expenses ordered returned		New positions furnished	Dismissed
		Number	Amount		
1916	846	578	$1,508 59	56	212
1915	1,035	678	2,370 15	86	271
1914	923	632	2,328 30	77	214
1913	479	364	1,384 45	47	68
1912	466	365	1,470 30	33	68
Totals	3,749	2,617	$9,061 79	299	833

Record of Prosecutions Conducted by the Bureau.

Fiscal year ending June 30th	Actions brought	Convictions secured
1916	100	57
1915	79	45
1914	130	70
1913	118	66
1912	173	80
Totals	600	318

PART I.

REVIEW.

PAYMENT OF WAGES.

On November 23, 1914, the Appellate Court of the First Appellate District declared the Wage Law of 1911 unconstitutional, and for a time it seemed as though one of the most important functions of the bureau would be destroyed. However, at the following session of the legislature an amendment was introduced seeking to meet the objections set forth in the decision of the Appellate Court. This amendment was drawn by the Attorney General, at the request of the Governor. The amendment has not as yet been tested in the higher courts. A few cases have gone to the Superior Court, where the law has been sustained. Thus far no appeals have been taken.

One of the features of the amended law is the provision for a penalty in the form of a continuing wage for a period of thirty days when wages are not paid at the time they are due and payable. Wage-earners have not availed themselves of this provision to any extent, possibly on account of the necessity of bringing a civil action to enforce the penalty. Most of the claimants have been satisfied to obtain the actual wages earned. In the case of *Glenn Gass* vs. *William Brucc,* Judge Graham of the Superior Court of San Francisco upheld the constitutionality of the penalty provision and imposed a penalty of thirty days' wages, or one hundred dollars.

An immense amount of detail work is necessary in the handling of a wage claim, and this branch of our work has been a very heavy drain on the department. This can be readily understood when it is realized that the majority of cases require the bringing together of the parties, hearing the evidence and arriving at a settlement. The number of claimants and the work involved has been steadily increasing, as is shown by the following figures:

Fiscal year 1912—	1,899 claims	$24,445 59 collected
Fiscal year 1913—	3,573 claims	36,450 69 collected
Fiscal year 1914—	7,330 claims	110,911 93 collected
Fiscal year 1915—	9,320 claims	153,804 26 collected
Fiscal year 1916—	10,167 claims	179,132 22 collected

One of the greatest difficulties encountered has been claims against contractors. There has been a growing tendency of contractors to accept contracts without the necessary funds to finance themselves and then to throw up the work when they get into difficulties, leaving their labor claims unpaid. These contractors as a rule have no fixed place of business and are execution proof. The unfortunate part of these failures is that a large number of the contracts have been on public works and require going through a great deal of "red tape" and a delay of considerable time before the wages can be secured from the public treasuries or the bonding companies. The failure of contractors on public works to pay wages has a very bad effect, owing to the fact that the men engaged upon these public works form the impression that the state, county or municipality, for whom the work is being done, is their real employer and is trying to cheat them out of their wages. It is very difficult to endeavor to enlighten them or try to explain to them that they are working for a private employer. Too little attention is paid, in awarding public contracts, to the financial standing and reputation of the contractor. The tendency is to award the contract to the lowest bidder and take a chance on the successful completion of the work. The legislature should provide further safeguards for wages earned on public works, and, if necessary, should establish a weekly pay day on such work and require the deposit by the contractor of cash, equal to one week's pay roll, with the authorities awarding the contract.

A great deal of assistance has been rendered by the bureau to wage claimants filing claims in attachment and bankruptcy proceedings. The bureau has had the necessary forms printed and these have been provided and filled out for the claimants without cost to them.

One of the most important steps to facilitate the settlement of wage claims was the amendments to sections 1999, 2000, 2001, 2002 and 2003 of the Civil Code. These amendments were introduced by the bureau at the last session of the legislature, and under their provisions an employment may be terminated at any time by either an employer or an employee, and in either case the employee shall receive compensation for the actual time employed. These amendments wiped out the inequalities of the old law and put an end to the disputes which continually arose as to the giving of notice of the termination of employment by either party.

Laborers were the largest group among the men filing wage claims. During 1914–15 this group represented 30 per cent of the total and 28 per cent during 1915–16. Farmhands were the next largest group, being 9 per cent of the total in 1914–15 and 11 per cent in 1915–16.

Domestics were the largest group among the women filing wage claims. During 1914–15 this group constituted 24 per cent of the total filing claims, and in 1915–16 they were 21 per cent. Nurse girls and stenographers were the next largest groups. (See Tables I and III.)

Of the industries against which wage claims were filed, construction and general contracting stands out most prominently. In 1914–15 over 21 per cent of the total number of claims were filed against this industry, and in 1915–16 they were 20 per cent. Other industries against which a large number of claims were filed were farming, private homes and restaurants. (See Tables II and IV.)

PAY CHECK LAW.

The pay check law, prohibiting the issuance in the payment of wages, of any check or evidence of indebtedness unless the same is negotiable and payable upon demand at some bank, or other established place of business, has been a great benefit to the wage-earners of this state. Several attacks were made upon this law in the lower courts, but in every instance the constitutionality of the statute has been sustained. Finally, an action went to the State Supreme Court and in the case of the *People* vs. *Ballestra,* the law was upheld as constitutional.

Just prior to the opening of the 1915 legislature, the question arose as to whether or not the act was broad enough to prohibit the issuance of nonnegotiable coupon books to employees between pay days, these coupon books being redeemable in merchandise at the commissaries or stores of the employer. The question was submitted to the Attorney General, and his opinion held that it would not be a violation of the law as it then stood to issue coupon books as an advance on wages earned, that is, between the regular pay days. The act was therefore amended and the use of scrip or coupons is prohibited if the same are redeemable otherwise than in money. The act now reads:

> "Section 1. (As amended, Stats. 1915, Chap. 628.) No person, firm or corporation shall issue, in payment of or as an evidence of indebtedness for wages due an employee, any order, check memorandum, or other acknowledgment of indebtedness, unless the same is negotiable, and is payable upon demand without discount in cash at some bank or other established place of business in the state; and no person, firm or corporation shall issue in payment of wages due, or wages to become due an employee, or as an advance on wages to be earned by an employee, any scrip, coupons, cards or other thing redeemable in merchandise or purporting to be payable or redeemable otherwise than in money."

It will be noted that under the provisions of the law, a check for wages may be made payable at some bank or other established place of business in the state. The state of California covers an enormous area and it often works a hardship upon wage-earners to receive a pay check payable five hundred miles away from the place of their employment, particularly when no one at that place wants to cash the checks for them, or if some local merchants will accept them only at a discount. It is often necessary for the employees to send their checks through the bank for collection, and this requires waiting around for a period of from three to five days, and, as may happen in some cases, without the men having the necessary funds to buy food during this waiting time. Many complaints of this nature have come to our attention, particularly from men employed on construction work and in the lumber camps. We believe that the time has come when pay checks should be made payable in the county in which the labor is performed.

PAYMENT OF WAGES IN SEASONAL EMPLOYMENT.

The law regulating the payment of wages earned in seasonal employment was introduced in 1913 by this bureau, and sought to regulate, primarily, the conditions surrounding the employment of men sent from San Francisco to work in the salmon canneries of Alaska. The appalling conditions found in our investigations of this industry are set forth in the fifteenth biennial report of the bureau.

Under the provisions of the act, we have maintained a supervision over the men employed in the salmon canneries since the season of 1913. At the close of the canning season of 1913, examiners of this bureau supervised the paying off of 1,382 men who had returned to San Francisco from Alaska. The total amount of wages earned by these men was $237,447. After allowing for the deductions permitted by the examiners, the men were paid a net average of over $110 each. At the close of the 1914 season, we supervised the paying off of 1,528 men, the total wages earned by these men was $259,134, and, after allowing deductions, each man received a net average of $120. At the close of the 1915 season, we supervised the paying off of 1,566 men, their total earnings being $264,870, or, a net average of $121.34 per man. At the close of the 1916 season, we supervised the paying off of 1,574 men, the total earnings being $279,698, or a net average of $128 per man. In addition to these net earnings, as given above, the men received $30 each before sailing for Alaska.

The value of this work is best shown in a comparison between the amount now received by these men on their return to San Francisco and the amount formerly received, as shown in our investigation made in 1912, when it was found that the average amount of money received by these men was less than $35 at the close of the season. After a considerable amount of effort, we have been able to wipe out most of the corrupt practices formerly surrounding this industry, particularly along the lines of the sale of liquor and gambling. There seems to be an inordinate desire on the part of these men to gamble, and we discovered the fact that many of them purchased their full quota of store supplies and gambled with the provisions as stakes. In the last two seasons the larger canners have agreed with the bureau to limit the store accounts of the men to $20 each for the season.

Upon conducting a further investigation in 1915, we found that the Chinese contractors had been paying from $5 to $7.50 to the so-called bosses for each man they were able to secure for work in the canneries. Upon taking this matter up with the canners and their contractors, they agreed that the practice would cease. The bosses or foremen are usually in the employ of firms that deal in clothing and general merchandise. We notified these firms that we would classify them as employment agencies if they continued the practice. At the opening of the 1916 season we learned that many of these firms had a new scheme in operation. Their plan was to make every man who desired to work sign up for a suit of clothing ranging in price from $30 to $40, these clothes to be delivered upon the return of the men from Alaska and to be paid for out of their season's earnings. We at once took the matter up with the contractors, and the firms agreed not to attach the wages of the men in case they refused to accept the clothes on their return from Alaska. In most instances, these firms kept faith, probably fearing that the contractor would have no further dealings with them if they did not live up to this agreement.

At the last session of the legislature, we introduced a bill exempting the wages of these cannery hands from attachment. The act passed, but had so many riders attached to it that the Governor was obliged to withhold his signature. We shall again introduce a bill, as the practice of attaching the wages of the men is carried on by a coterie of shysters, who even go so far as to file attachments against individuals who have not incurred any indebtedness, knowing full well that the men have no means to fight the suit. In several instances the bureau, believing that these attachment suits were not *bona fide,* has fought the case for the defendants.

SEMIMONTHLY PAY DAY LAW.

The semimonthly pay day law, enacted in 1915, has proven to be a rather ambiguous statute. By requiring that a demand must be made for wages by the employee, the law is made practically inoperative. As soon as an employee makes a demand, he is paid and usually discharged for demanding that to which he is lawfully entitled. By allowing a holdback of fifteen days, the law virtually provides for a monthly pay day. This question was submitted to the Attorney General, and in his opinion he held that the payment, at the end of any month, of the wages earned during that month would meet the requirements of the law. While the majority of employers have complied with the spirit of the law, the number that have resorted to subterfuge, knowing its weak points, justifies us in recommending that the statute be amended to provide for the establishment of semimonthly pay days, with a holdback of not more than five days. The amendments should be broad enough to make the failure to establish and maintain regular pay days a misdemeanor, without requiring that a demand must be made by the employee.

GRATUITIES.

The law making it a misdemeanor for any manager, superintendent, foreman or other person to receive any fee, gift or other remuneration, in consideration of hiring, employing or permitting any person to continue in his employment, has been generally observed in most industrial establishments. The practice of dividing tips, however, has continued in hotels, restaurants and cafes, owing to the unwillingness of the men employed in these places to testify against the managers.

Some of our investigations brought to light a new phase not covered by the statute, and that is, the division of tips received by employees—not with the managers, but with their employers, as a condition of holding their positions.

We found that there is a general system in vogue in the check room privileges of hotels and restaurants, and some of the persons holding these privileges operate in the larger cities throughout the United States.

An investigation of one of the large restaurants furnishes a typical case. The owners of the restaurant leased to "X" the privilege of operating the hat and cloak check room for the sum of $350 per month. "X" in turn hired eight girls, to whom he paid $10 per week. The condition of their employment was that the girls must drop into a box provided by "X" all the tips received by them from the patrons of the restaurant. The girls were obliged to wear waists with high collars and dresses without pockets so that they could not withhold any of the tips received. Some of these girls testified that they received from six to ten dollars a day in tips, which they had to turn over to their employer, and that the employer sought to employ only attractive women so that the patrons would give them large tips.

In one of the skating rinks we found that the privilege of putting on skates for the patrons had been leased out as a concession. The lessee hired a number of boys, who were obliged to pay $1.50 per day for their jobs, with the privilege of retaining their tips. Upon informing the lessee that the bureau would hold him to be an employment agent if he continued to charge boys for their jobs, he resorted to the subterfuge of making them sublessees.

The entire system should be wiped out, particularly as it affects the employment of women. In plain language, it amounts to nothing more than earning money on the looks of the women employed.

EMPLOYMENT ON PUBLIC WORKS.

The present laws limit the hours of employment of any laborer, workman or mechanic upon any of the public works of the state, or any political subdivision thereof, to eight hours in one day. The Appellate Court has held that this law does not include work which is paid for directly by the property owners whose property abuts on public improvements.

A large amount of street work is done under the provisions of the

Vrooman Act and the bond act of 1911, and the contractors doing this work have been employing their men in excess of eight hours. The penalty provision of the present law is not broad enough to reach these contractors. We believe that the intent of the law is to fix an eight-hour day on all public work. We recommend that the law be amended to apply to all public work authorized by the state or a political subdivision thereof, whether the same be paid out of the public treasuries or assessed against property owners or by bond issues. Such an amendment will go a long ways towards improving the condition of employment on public work, will require a closer scrutiny of such work and will prevent, in a measure, some of the difficulties which this bureau has had to meet upon the failure of contractors to pay wages, as discussed in the paragraph on the "Payment of Wages."

PUBLIC EMPLOYMENT BUREAUS.

In 1912 and again in 1913 Governor Hiram W. Johnson directed the commissioner of this bureau to investigate the condition of the unemployed, with a view of determining what could be done to relieve or correct this condition. Again in 1914 the Governor requested this bureau and many of the state commissions to study the problem and suggest remedies.

The bureau, while frankly admitting that the employment exchanges did not create employment, urged their establishment as the most tangible and effective work that could be undertaken by the state. The Governor in his message to the legislature in 1915, recommended the creation of free labor exchanges, and, upon his recommendation, a bill was drafted and passed establishing free employment bureaus, under the direction of the Labor Commissioner. The work of these bureaus started in February, 1916, with the opening of offices in San Francisco, Oakland, Sacramento and Los Angeles, in the latter place the state cooperating with the municipal bureau already established.

From their very inception the public employment bureaus became popular with the working people. It required some time and effort, however, to convince the employers that we were sincere in our statements to them, that we would operate the bureaus as departments of service and not for the purpose of trying out any idea of "faddists," or endeavor to unload upon them the unemployable or persons not fitted for the work required.

The success of the public employment bureaus has gone far beyond all expectations. Many of the largest employers of the state are now listed as patrons of the bureaus and letters of commendation have been received from them on the efficiency of the service rendered.

The most enthusiastic supporters of the public employment bureau bills in the legislature argued that if the state were able to fill ten thousand jobs the first year, the bureaus could be counted as a success and would justify the expenditure of the money appropriated for them. The records show, however, that during the first nine months of their existence the public employment bureaus have filled 38,850 positions, or nearly four times as many as was estimated for the entire year. At the present rate alone these bureaus are saving to the toilers of the state approximately $125,000 per year, which they would have had to pay in fees to private agencies.

But this is not the only value of their work. We must also take into consideration the better service rendered to the employer and the employee, and the elimination of the various sorts of favoritism, splitting of fees and the giving of gratuities, which practices were associated with the operation of many private employment agencies and which worked to the detriment of both the employer and the employee.

No small part of the success of the public employment bureaus is due to the interest taken by the employees of the department in their work. They have volunteered to work long hours in order to see that orders were properly filled and to supervise the shipment of men to jobs outside the cities in which the offices were located.

Many requests have been received from municipalities throughout the state, asking that branch offices be established in them. There is no question as to the necessity and advisability of opening additional offices. The number of other offices to be opened depends, however, upon the amount of money appropriated for this purpose and any action the legislature may take towards the elimination of the private agencies.

PRIVATE EMPLOYMENT AGENCIES.

Several important amendments were added to the private employment agency law in 1915. These amendments sought to remedy the defects that experience in enforcement had brought to light. One of the most important of these amendments was the prohibiting of the collection of registration fees in advance of the agent having any positions to offer applicants. The license fee was doubled in the larger cities and between this increase in license fee and the inroads of the public employment bureaus, the number of private employment agencies has been considerably reduced. It is becoming very evident that only a few of the larger and better conducted agencies can withstand the present drastic regulation and the competition of the public employment bureaus.

Bills were introduced to regulate the amount of fee to be charged by private agencies, but these did not become laws. The competition of the public employment bureaus has forced down the fee charged by private agencies in the general classes of work. However, the agencies furnishing office and clerical help are charging an average fee of 30 per cent of the first month's salary. This is due largely to the fact that the state has not as yet been able to develop a fully-equipped commercial department.

A very strict supervision over private employment agencies has been maintained by the bureau, and they are required to keep and furnish complete records of all their transactions. During the fiscal year 1915 a total of 1,035 complaints were filed in the bureau against private employment agencies. In 678 cases fees and expenses amounting to $2,370.15 were ordered returned to the claimants. During the fiscal year 1916 a total of 846 complaints were filed and in 578 cases fees and expenses amounting to $1,508.59 were ordered returned. The complaints filed with the bureau in no way represent the amount of refunds that have been made to applicants; in fact, the private employment agencies now endeavor to adjust these claims before they reach the bureau. We have, however, required the agencies to keep a complete record of all fees and expenses refunded. The record for the license year 1915–16 shows that $112,020.40 was refunded to 52,804 applicants and that expenses amounting to $773.03 were returned to 374 applicants. It is safe to say that a very small part of this money would have been returned to these applicants if the bureau did not have the control of the private employment agencies well in hand.

The importance of bonding the private agencies was demonstrated in the case of the *People* vs. *Midgley*. The defendant, an employment agent, had succeeded for a time in covering up his operations by the use of a duplicate set of books. The bureau finally succeeded in trapping him and brought prosecution under the provisions of the Employment Agency Act. Defendant was found guilty and was sentenced to serve six months in the county jail. The bonding company was called upon to reimburse the persons who had been fleeced by this agent, and was obliged to pay into the bureau the sum of $1,224.50 for the benefit of the claimants.

Records for the license year 1915–16 show that 216,624 persons paid to private employment agencies fees amounting to $454,447.42. Of this number, 158,771 were men and 57,853 women. The average fee paid by the men was $2.05 and the average fee paid by the women $2.25. (See Tables V, VI and VII.) In Tables VIII and VIII*a* are presented lists of the licensed private employment agencies in the state of California.

CHILD LABOR.

Many changes were made in the Child Labor Law in 1915. The age at which children could be employed under various conditions was raised in many instances. However, efforts of too many persons to incorporate their own ideas into this law has made it more difficult of administration. The number of amendments proposed and attached to the bill at the last session of the legislature have developed a number of inconsistencies. For example, a child fourteen years of age, whose parents are incapacitated through illness, etc., may secure a temporary permit, while no provision is made for a child fifteen years of age under the same conditions.

One of the features of the 1915 amendments was the regulation of street trades, prohibiting boys under ten years of age and girls under eighteen years of age from engaging in street trades in cities having a population of over 23,000. Street trades have been the subject of considerable discussion, and, from our experience, we deem it advisable to maintain this minimum age restriction in the Child Labor Law and under the jurisdiction of the state. The question of further regulation of street trades and the issuance of badges to children engaged therein should be left to the local authorities.

We strongly recommend that bureaus be established in the larger cities, under the control of the school department, so that the issuance of permits and certificates may be centralized. Persons properly fitted should be assigned to this work by the local authorities. We believe that a grave error will be committed if support is given to any attempts to take the enforcement of the Child Labor Law out of the hands of the Bureau of Labor Statistics, which has spent much time and energy in wiping out child labor in this state.

At present the following permits are issued under the provisions of the Child Labor Law:

Permit to Work (Graduate):

Where the minor is fourteen years of age and has completed the prescribed grammar school course, and is physically fitted for the work contemplated.

Permit to Work (Temporary):

Where the minor is fourteen years of age and the parent is incapacitated through illness or injury, or through the death or desertion of the father the family is in need of the earnings of such minor. The permit is issued only for a temporary period, not to exceed six months.

Age and Schooling Certificate:

Where the minor is fifteen years of age and has completed the prescribed grammar school course, or has completed the seventh grade and is a regular attendant at night school.

Vacation Permit:

Where the minor is over twelve years of age, but for use only during the regular vacations of the public schools and on the regular weekly school holidays.

Special Permit:

Where the minor is fourteen years of age, but for use only outside of school hours.

During the past two years the following permits have been issued in the state:

	Total	Male	Female
June 25, 1914, to June 25, 1915:			
Age and schooling certificates	1,166	837	329
Permits to work (graduate)	276	207	69
Permits to work (temporary)	449	350	99
June 25, 1915, to June 25, 1916:			
Age and schooling certificates	834	617	226
Permits to work (graduate)	243	184	59
Permits to work (temporary)	404	318	86

During the year 1914–15 a total of 1,166 Age and Schooling Certificates were issued in the state. Of this number 291 had graduated from the grammar grades, while 875 were nongraduates and were obliged to attend night school. The record of nativity of these children shows that 503 were born in California, 410 in the rest of the United States and 253 were foreign born. (See Table XII.)

During the same period 276 Permits to Work (Graduate) were issued to children. Of this number 115 were born in California, 133 in the rest of the United States and 28 were foreign born. (See Table XIII.)

Permits to Work (Temporary) were issued to 449 children, of whom 208 were born in California, 182 in the rest of the United States and 59 in foreign countries. (See Table XIV.) Most of these temporary permits were issued for a period of six months. (See Table XV.)

The figures as given above are a record of the permits issued under the provisions of the law prior to its amendment. The figures that follow cover a record of permits issued under the amended statute. During the year 1915–16 a total of 834 Age and Schooling Certificates were issued in the state. Of this number 366 were children who had graduated from the grammar grades, while 477 had completed the seventh grade and were attending night school. The record of nativity of these children shows that 379 were born in California, 316 in the rest of the United States and 148 in foreign countries. (See Table XII*a*.)

During the same period 243 Permits to Work (Graduate) were issued to children in the state. Of this number 89 were born in California, 129 in the rest of the United States and 25 were foreign born. (See Table XIII*a*.)

Permits to Work (Temporary) were issued to 404 children, of whom 199 were born in California, 134 in the rest of the United States and 71 in foreign countries. (See Table XIV*a*.)

During the fiscal year 1914–15 there were filed in the bureau 108 complaints for violations of the Child Labor Law. These complaints were investigated, and it was necessary to bring prosecutions in four cases. During the fiscal year 1915–16 there were filed 141 complaints and prosecutions were undertaken in seven cases.

EIGHT HOUR LAW FOR WOMEN.

The constitutionality of the Eight Hour Law for Women, as passed in 1913, was attacked in the case of *Ex parte Miller,* generally known as the "hotel case." The act was upheld by the Supreme Court of the state of California, 162 Cal. 687, and an appeal was taken to the Supreme Court of the United States. The constitutionality of the amended act of 1915 was attacked in a petition filed in the District Court of the United States for the Northern District of California, seeking to restrain the Labor Commissioner from enforcing the law against the Merritt Hospital of Oakland. The petition was denied—*Wm. B. Bosley et al.* vs. *John P. McLaughlin et al.,* and this case, known as the "hospital case," on account of the regulation of the hours of student nurses being at issue, was appealed to the United States Supreme Court. These two cases came up together for hearing before the United States Supreme Court and able briefs were presented for the state by Louis Brandeis, William Denman and the Attorney General. On February 23, 1915, the Supreme Court upheld the constitutionality of both the original and the amended law in a broad and sweeping decision written by Justice Hughes. The amended law of 1915 gave the Labor Commissioner extensive powers for the enforcement of its provisions. Prior to that time the bureau had enforced the law of its own volition, to prevent its becoming a dead letter.

During the fiscal year 1915–16 there were filed 622 complaints for violations of the Eight Hour Law for Women. These complaints were investigated and prosecutions were undertaken in 24 cases. During the fiscal year 1914–15 there were filed 630 complaints and eight cases were prosecuted.

The record of complaints for violations of the eight hour law shows that hotels, apartment and boarding houses, restaurants and laundries were the principal offenders. (See Tables XVI and XVII.)

COMPLAINTS.

Complete records are kept of all complaints filed with the bureau. While we have not attempted to adhere to the practice of courts in the handling of complaints, we have, however, installed a simple, effective system of handling and recording these complaints. Each complaint contains a verified statement by the complainant and a complete record of the investigations and hearing had thereon.

During the fiscal year 1915–16 a total of 12,366 complaints was filed with the bureau and investigated. During the fiscal year 1914–15 a total of 11,448 complaints were filed and investigated. In other words, in the past two years the bureau has handled 23,814 complaints or an average of almost one thousand complaints a month. (See Tables XVIII–XIX.)

PROSECUTIONS.

The bureau has continued to pursue the same policy in the matter of prosecutions, that is, it has not desired to make any record by undertaking a large number of prosecutions. Our policy has been to warn and instruct employers when violations were found and to prosecute only when such employers continued to violate the law or when absolute disregard for the law was shown.

During the fiscal year 1915–16 the bureau conducted 100 prosecutions, securing 57 convictions, while during the fiscal year 1914–15 79 prosecutions were conducted and 45 convictions secured.

TABLE I.—Wage Claims Investigated During Fiscal Year Ending June 30, 1915.

(Showing occupation and sex of complainants.)

Occupation and sex	Total for state	San Francisco office	Los Angeles office	Sacramento office	San Diego office
Males—					
Actor	93	30	57	6	--------
Advertiser	7	2	5	--------	--------
Agent	10	10	--------	--------	--------
Artisans (n. e. s.)	138	44	44	40	10
Baker	57	26	14	15	2
Barber	21	7	11	3	--------
Bartender	42	26	7	9	--------
Blacksmith	28	7	10	6	5
Bookkeeper	23	6	12	4	1
Bootblack	10	4	4	2	--------
Bricklayer	12	5	7	--------	--------
Butcher	13	6	4	3	--------
Cabinetmaker	21	5	16	--------	--------
Candymaker	5	3	1	1	--------
Cannery hand	33	18	--------	15	--------
Carpenter	366	117	151	77	21
Chauffeur	146	38	87	16	5
Clerk	132	68	47	12	5
Conductor	7	4	--------	3	--------
Cook	296	105	113	60	18
Deckhand	24	21	--------	2	1
Decorator	9	4	5	--------	--------
Detective agencies, etc.	13	4	5	--------	4
Dishwasher	145	57	66	22	--------
Driller	16	14	2	--------	--------
Driver	83	43	27	11	2
Electrician	40	14	16	8	2
Elevatorman	15	12	3	--------	--------
Engineering	87	30	40	11	6
Entertainer	12	10	--------	--------	2
Farm hand	685	139	73	407	66
Fireman	5	4	1	--------	--------
Foremen and managers	66	29	22	10	5
Fruit picker	119	44	2	73	--------
Gardener	57	9	33	13	2
Helpers, artisans	24	20	1	--------	3
Hodcarriers	3	3	--------	--------	--------
Hotel help (n. e. s.)	40	40	--------	--------	--------
Ironworker	9	5	--------	2	2
Janitor	78	31	44	3	--------
Jeweler	3	2	1	--------	--------
Kitchen help (n. e. s.)	35	32	2	1	--------
Laborer	2,338	615	1,208	340	175
Laundry hand	15	12	--------	1	2
Machinist	93	41	12	34	6
Mason	32	14	7	9	2
Messenger	58	22	16	13	7
Milker	41	5	3	32	1
Millwright	44	7	1	36	--------
Miner	326	123	38	159	6
Molder	2	--------	1	1	--------
Musician	58	20	24	14	--------
Newsboy	11	11	--------	--------	--------
Nurse	9	4	5	--------	--------
Operator, machine	29	7	22	--------	--------
Operator, movie	18	2	16	--------	--------
Painting	218	94	94	23	7
Paperhanger	7	7	--------	--------	--------
Photographer	7	--------	2	4	1
Plasterer	48	19	24	4	1
Plumber	30	11	17	2	--------
Porter	66	43	12	7	4
Printer	46	25	19	2	--------
Railroad help (n. e. s.)	62	5	--------	57	--------
Restaurant help	33	12	9	--------	12
Salesman	113	54	41	15	3
Solicitor	71	22	31	14	4

TABLE I.—Wage Claims Investigated During Fiscal Year Ending June 30, 1915—Continued.

(Showing occupation and sex of complainants.)

Occupation and sex	Total for state	San Francisco office	Los Angeles office	Sacramento office	San Diego office
Males—Continued.					
Stableman	24	11		13	
Stenographer	10	2	8		
Stevedore	2	2			
Surveyor	12	6	4		2
Tailor	70	46	21	2	1
Teamster	191	43	112	24	12
Theatrical help	18	8	1	9	
Waiter	155	75	58	19	3
Watchman	54	39	9	3	3
Wellborer	16	10		6	
Window cleaner	21	15	2	4	
Woodchopper	129	4		125	
Wrecker	4	4			
Miscellaneous	137	95	6	26	10
Totals	7,646	2,633	2,756	1,833	424
Females—					
Actress	128	67	54	6	1
Bookkeeper	23	8	12	2	1
Cannery hand	11	1		10	
Cashier	11	6	5		
Clerk	49	31	18		
Cook	81	33	37	8	3
Domestic	400	125	233	27	15
Dressmaker	55	42	6	4	3
Entertainer	17	9		1	7
Factory hand	8	5	3		
Fruit picker	3			3	
Hairdresser	4	3	1		
Housekeeper	58	49		5	4
Kitchen help (n. e. s.)	3	3			
Laundress	24	5	14	4	1
Maid	45	44			1
Milliner	6	3	3		
Musician	9	5	2	2	
Nurse	230	43	122	58	7
Operator, phone	4	2	2		
Saleslady	33	30		2	1
Seamstress	46		46		
Solicitor	13	7	2	3	1
Stenographer	216	93	102	15	6
Tailoress	27	22	2	2	1
Waitress	132	54	45	23	10
Miscellaneous	38	24	10	2	2
Totals	1,674	714	719	177	64
Recapitulation—					
Males	7,646	2,633	2,756	1,833	424
Females	1,674	714	719	177	64
Totals	9,320	3,347	3,475	2,010	488

TABLE II.—Wage Claims Investigated During Fiscal Year Ending June 30, 1915.
(Showing industries against which claims were filed.)

Industries	Total for state	San Francisco office	Los Angeles office	Sacramento office	San Diego office
Advertising	33	23	6	4	--------
Agents, manufacturers	39	28	6	5	--------
Amusement	53	43	7	--------	3
Architect	17	9	6	2	--------
Attorneys	59	14	39	5	1
Automobile	159	45	73	39	2
Aviation	6	6	--------	--------	--------
Bakery	103	45	23	31	4
Barbering	34	17	13	4	--------
Bathing	2	1	1	--------	--------
Blacksmithing	21	6	9	5	1
Bootblack	10	3	4	2	1
Brewing	4	3	--------	1	--------
Brokers	90	9	76	1	4
Building materials (n. e. s.)	45	14	12	12	7
Butcher	14	6	2	6	--------
Cabinetmaking	5	5	--------	--------	--------
Cafe	216	23	193	--------	--------
Canning and packing	69	27	19	23	--------
Carriages and wagons	1	1	--------	--------	--------
Chemicals	5	5	--------	--------	--------
Cleaning and dyeing	45	10	31	3	1
Cloaks and suits	14	14	--------	--------	--------
Clubs and societies	52	17	26	7	2
Commission merchants	6	6	--------	--------	--------
Confectionery	37	17	14	5	1
Contractor	2,036	731	833	297	175
Creamery	7	7	--------	--------	--------
Dairy	79	8	29	36	6
Detective agencies	13	7	6	--------	--------
Draying	29	19	4	5	1
Dressmaking	42	25	15	1	1
Electrical supplies, etc.	36	23	6	7	--------
Employment agency	9	5	2	2	--------
Engineering	2	--------	--------	2	--------
Express	57	10	41	5	1
Farming	979	167	254	487	71
Fishing	2	2	--------	--------	--------
Florist	22	10	8	3	1
Furniture	18	10	4	4	--------
Grocery	45	18	16	6	5
Hairdressing	5	4	--------	1	--------
Hats	3	3	--------	--------	--------
Hay and grain	7	3	2	2	--------
Hotel	365	159	149	46	10
Houses, apartments and boarding	109	75	34	--------	--------
Ice	1	1	--------	--------	--------
Insurance	20	13	7	--------	1
Ironworks	30	11	15	2	2
Irrigation	6	3	--------	3	--------
Jewelry	12	5	2	5	--------
Laundry	58	29	22	4	3
Light and power	16	10	6	--------	--------
Lime and cement	2	1	1	--------	--------
Livery stable	23	13	1	9	--------
Lumbering	88	37	5	45	1
Machinery and implements	5	3	2	--------	--------
Manufacturing (n. e. s.)	151	39	110	1	1
Markets	13	8	4	1	--------
Medical	108	21	57	26	4
Millinery	11	8	3	--------	--------
Mining	353	141	50	159	3
Musical instruments	13	9	4	--------	--------
News dealers	12	11	--------	--------	1
Novelty	4	4	--------	--------	--------
Oil	54	24	21	7	2
Painting	33	30	3	--------	--------
Photography	9	4	4	1	--------

TABLE II.—Wage Claims Investigated During Fiscal Year Ending June 30, 1915— Continued.

(Showing industries against which claims were filed.)

Industries	Total for state	San Francisco office	Los Angeles office	Sacramento office	San Diego office
Plumbing	21	12	6	3	--------
Printing and publishing	118	47	53	15	3
Private houses	652	281	259	76	36
Quarrying	16	1	--------	15	--------
Railroad	143	20	35	82	6
Real estate	390	67	243	62	18
Reclamation	1	1	--------	--------	--------
Resort, summer	11	11	--------	--------	--------
Restaurant	472	263	79	89	41
Saloon	68	32	20	13	3
School	13	3	7	2	1
Sheet metal	2	2	--------	--------	--------
Shipping	45	31	3	6	5
Stenography	8	4	4	--------	--------
Stores, department	224	17	207	--------	--------
Stores (n. e. s.)	99	42	--------	33	24
Tailoring	91	54	32	3	2
Telephone and telegraph	12	4	1	7	--------
Theatrical	404	153	203	40	8
Tobacco	14	7	3	4	--------
Undertaking	2	2	--------	--------	--------
Well boring	13	3	--------	8	2
Window cleaning	14	13	--------	1	--------
Winery	36	2	1	33	--------
Wrecking	7	7	--------	--------	--------
Miscellaneous	381	123	39	196	23
Not stated	37	37	--------	--------	--------
Totals	9,320	3,347	3,475	2,010	488

TABLE III.—Wage Claims Investigated During Fiscal Year Ending June 30, 1916.

(Showing occupation and sex of complainants.)

Occupation and sex	Total for state	San Francisco office	Los Angeles office	Sacramento office	San Diego office
Males—					
Actor	203	43	146	12	2
Advertiser	20	6	14	--------	--------
Agent	14	3	1	7	3
Artisans (n. e. s.)	45	2	39	1	3
Baker	47	19	18	10	--------
Barber	17	9	4	2	2
Bartender	70	53	7	8	2
Blacksmith	26	10	11	4	1
Bookkeeper	43	18	21	4	--------
Bootblack	14	2	9	3	--------
Bricklayer	38	6	32	--------	--------
Butcher	16	5	8	3	--------
Buttermaker	2	1	--------	1	--------
Cabinetmaker	10	3	5	2	--------
Candymaker	10	6	2	1	1
Cannery hand	35	24	3	8	--------
Carpenter	393	118	186	68	21
Carrier, paper	7	3	4	--------	--------
Chauffeur	167	41	104	11	11
Clerk	186	74	73	35	4
Cook	265	106	102	44	13
Deckhand	15	5	--------	10	--------
Decorator	19	10	9	--------	--------
Detective	9	1	6	1	1
Dishwasher	128	59	54	13	2
Driller	8	2	6	--------	--------
Driver	109	48	44	13	4
Electrician	38	10	21	6	1
Elevatorman	9	4	4	1	--------
Engineer	103	30	50	18	5
Entertainer	28	16	5	5	2
Farm hand	956	149	228	452	127
Fireman	7	2	1	3	1
Fisherman	4	1	--------	2	1
Foremen and managers	75	32	26	12	5
Fruit picker	108	1	11	96	--------
Gardener	88	13	59	11	5
Helpers, artisans	18	11	7	--------	--------
Hodcarriers	8	5	3	--------	--------
Hotel help (n. e. s.)	56	41	7	8	--------
Interpreter	2	1	1	--------	--------
Ironworker	16	11	5	--------	--------
Janitor	94	30	51	10	3
Jeweler	7	6	1	--------	--------
Kitchen help (n. e. s.)	29	20	9	--------	--------
Laborer	2,352	811	1,001	486	54
Laundry hand	32	10	21	1	--------
Machinist	195	77	75	34	9
Mason	11	3	8	--------	--------
Messenger	34	22	11	1	--------
Milker	50	1	22	26	1
Millwright	10	2	6	1	1
Miner	352	81	86	180	5
Molder	4	1	1	2	--------
Mucker	3	2	1	--------	--------
Musician	54	20	26	6	2
Newsboy	45	22	18	2	3
Nurse	12	1	10	1	--------
Operator, movie	27	1	22	2	2
Painter	238	95	106	29	8
Paperhanger	13	6	6	1	--------
Photographer	3	1	--------	1	1
Plasterer	54	15	21	15	3
Plumber	38	7	28	3	--------
Porter	78	45	18	10	5
Pressman	6	4	2	--------	--------
Printer	16	4	11	1	--------

TABLE III.—Wage Claims Investigated During Fiscal Year Ending June 30, 1916—Continued.

(Showing occupation and sex of complainants.)

Occupation and sex	Total for state	San Francisco office	Los Angeles office	Sacramento office	San Diego office
Males—Continued.					
Railroad help (n. e. s.)	38	3	2	28	5
Restaurant help	95	66	11	7	11
Salesman	82	36	39	7	
Seaman	15	15			
Solicitor	88	25	47	15	1
Stableman	26	18	1	6	1
Stenographer	9	2	4	2	1
Surveyor	4	1	1	1	1
Tailor	65	32	26	3	4
Teamster	165	31	95	28	11
Theatrical help	42	16	8	16	2
Tinsmith	3	1	2		
Upholsterer	10	3	4	2	1
Utility	16	13	3		
Vendor	3	1	2		
Waiter	147	75	48	16	8
Watchman	58	28	21	7	2
Wellborer	19	3	13	3	
Window cleaner	21	8	10	3	
Woodchopper	47	24		23	
Wrecker	3	3			
Miscellaneous	168	74	32	50	12
Not stated	120	96		24	
Totals	8,433	2,865	3,266	1,928	374
Females—					
Actress	88	55	30	2	1
Bookkeeper	16	12	2	2	
Cashier	13	3	8	2	
Clerk	41	26	9	6	
Cook	81	26	32	16	7
Domestic	372	163	155	22	32
Dressmaker	106	44	57	5	
Entertainer	8	2	3		3
Factory hand	11	1	8	1	1
Hairdresser	13	11	1		1
Housekeeper	86	69	3	14	
Laundress	27	11	15		1
Maid	116	19	87	10	
Milliner	8	3	4	1	
Musician	12	3	6		3
Nurse	230	53	106	52	19
Operator, phone	3	2	1		
Saleslady	26	17	3	5	1
Solicitor	8	5	2		1
Stenographer	210	81	117	6	6
Tailoress	18	8	9		1
Teacher	12	6	6		
Waitress	204	89	69	24	22
Miscellaneous	25	20	2	2	1
Totals	1,734	729	735	170	100
Recapitulation—					
Males	8,433	2,865	3,266	1,928	374
Females	1,734	729	735	170	100
Totals	10,167	3,594	4,001	2,098	474

TABLE IV.—Wage Claims Investigated During Fiscal Year Ending June 30, 1916.
(Showing industries against which claims were filed.)

Industries	Total for state	San Francisco office	Los Angeles office	Sacramento office	San Diego office
Advertising	30	16	9	1	4
Agents, manufacturers	57	34	17	4	2
Amusement	70	29	35	1	5
Architect	33	5	25	2	1
Attorneys	90	20	57	5	8
Automobile	233	83	99	36	15
Bakery	77	34	28	14	1
Barbering	26	11	9	4	2
Bathing	7	5	2	--------	--------
Blacksmithing	12	4	4	4	--------
Bootblack	16	2	9	3	2
Brewing	3	1	2	--------	--------
Brokers	56	12	44	--------	--------
Butcher	17	9	3	4	1
Cabinetmaking	8	4	2	--------	2
Cafe	185	73	79	8	25
Canning and packing	45	31	5	9	--------
Cleaning and dyeing	34	12	17	4	1
Clubs and societies	54	15	36	1	2
Commission merchants	25	4	14	6	1
Confectionery	41	22	15	3	1
Contractor	1,990	706	856	375	53
Creamery	17	3	7	7	--------
Dairy	103	14	48	30	11
Detective agencies	11	1	7	2	1
Draying	66	29	37	--------	--------
Dressmaking	63	29	31	3	--------
Electrical supplies, etc.	30	13	3	11	3
Employment agency	16	5	6	5	--------
Engineering	23	14	8	1	--------
Express	34	20	4	7	3
Farming	1,248	164	350	595	139
Fishing	7	4	--------	2	1
Florist	7	4	3	--------	--------
Furniture	6	4	1	--------	1
Grocery	51	12	29	10	--------
Hairdressing	18	15	1	--------	2
Hay and grain	23	1	9	13	--------
Hotel	308	156	88	55	9
Hospitals	21	8	13	--------	--------
Houses, apartments and boarding	158	70	78	5	5
Ice	44	39	5	--------	--------
Insurance	20	7	4	9	--------
Ironworks	31	27	2	--------	2
Irrigation	6	1	--------	4	1
Jewelry	24	8	14	--------	2
Laundry	59	23	29	6	1
Light and power	11	7	4	--------	--------
Livery stable	28	14	8	6	--------
Lumbering	97	77	3	17	--------
Machinery and implements	20	2	16	1	1
Manufacturing (n. e. s.)	211	55	127	21	8
Markets	55	15	35	5	--------
Medical	58	14	14	27	3
Millinery	10	7	3	--------	--------
Mining	472	131	130	201	10
Musical instruments	10	5	2	3	--------
News dealers	39	23	7	5	4
Oil	30	9	13	8	--------
Painting	47	23	9	15	--------
Photography	13	4	3	5	1
Plumbing	25	9	14	2	--------
Printing and publishing	93	35	56	1	1
Private houses	766	246	396	102	22
Quarrying	22	6	6	10	--------
Railroad	75	12	29	32	2
Real estate	404	73	248	66	17
Resort, summer	12	7	--------	5	--------

TABLE IV.—Wage Claims Investigated During Fiscal Year Ending June 30, 1916—Continued.

(Showing industries against which claims were filed.)

Industries	Total for state	San Francisco office	Los Angeles office	Sacramento office	San Diego office
Restaurant	599	328	169	68	34
Saloon	111	81	16	11	3
School	38	14	22	1	1
Sheet metal	8	1	7	--------	--------
Shipping	41	34	5	2	--------
Stages	9	1	1	5	2
Stenography	9	1	7	--------	1
Stores, department	38	2	35	1	--------
Stores (n. e. s.)	170	55	60	46	9
Tailoring	91	43	42	2	4
Telephone and telegraph	23	6	9	8	--------
Theatrical	501	168	279	36	18
Undertaking	9	4	2	2	1
Well boring	13	3	7	3	--------
Window cleaning	11	5	5	1	--------
Winery	3	2	--------	1	--------
Wrecking	14	12	1	--------	1
Miscellaneous	270	112	67	67	24
Not stated	208	145	--------	63	--------
Totals	10,167	3,594	4,001	2,098	474

TABLE V.—Private Employment Agencies of the State. Record for One Year Ending March 31, 1916.

(Showing positions furnished, fees charged, refunds made, etc., by locality and class of agency.)

Class of agency	Positions furnished men			Positions furnished women			Total positions furnished		Refunds made			
									Fees refunded		Expenses refunded	
	Number	Fees charged	Average fee	Number	Fees charged	Average fee	Number	Fees charged	Number	Amount	Number	Amount
San Francisco—												
Commercial	740	$7,808 15	$10 01	1,595	$8,787 52	$5 51	2,335	$16,595 67	834	$2,238 30	2	$4 60
Female	113	490 50	4 34	3,468	10,308 15	2 97	3,581	10,798 65	903	2,602 50		
General	33,392	66,451 65	1 99	881	1,795 10	2 04	34,273	68,246 75	7,152	11,609 94	102	273 20
Hotel	11,428	40,258 20	3 53	8,435	20,829 50	2 47	19,863	61,087 70	9,638	30,652 50	8	42 10
Oriental†	5,265	15,291 57	2 90	74	181 25	2 45	5,339	15,472 82	1,090	2,846 51	1	1 00
Teachers	60	3,757 40	62 62	50	2,481 63	49 63	110	6,239 03			1	9 80
Theatrical*												
Totals	50,998	$134,057 47	$2 63	14,503	$44,383 15	$3 05	65,501	$178,440 62	19,616	$49,949 75	114	$330 70
Los Angeles—												
Commercial	1,436	$18,781 70	$13 08	1,343	$10,776 87	$8 02	2,779	$29,558 57	25	$177 25		
Female	67	127 60	1 90	5,014	8,737 40	1 74	5,081	8,865 00	1,826	3,266 15		
General	37,077	64,369 62	1 71	5,311	7,966 50	1 50	42,388	72,336 12	12,173	24,454 32	179	$291 83
Hotel	12,580	22,313 16	1 77	12,970	18,634 99	1 44	25,550	40,948 15	10,116	18,177 25	4	9 40
Nurses	156	1,437 00	9 21	2,182	2,281 50	1 05	2,338	3,718 50	32	125 00		
Oriental†	3,559	5,613 88	1 58	48	43 65	91	3,607	5,657 53	343	849 29	2	2 45
Teachers	46	2,308 50	50 18	92	2,325 43	25 27	138	4,633 93	3	29 24		
Theatrical*												
Totals	54,921	$114,951 46	$2 09	26,960	$51,766 34	$1 88	81,881	$165,717 80	24,518	$47,078 50	185	$303 68
Oakland—												
Female	86	$173 90	$2 02	3,732	$5,931 95	$1 59	3,818	$6,105 85	1,129	$1,895 69		
General	970	2,508 33	2 59	3,721	7,426 80	2 00	4,691	9,935 13	2,197	4,175 85	9	$15 65
Oriental†	389	736 85	1 89	35	61 95	1 77	424	798 80	8	9 50		
Totals	1,445	$3,419 08	$2 37	7,488	$13,420 70	$1 79	8,933	$16,839 78	3,334	$6,081 04	9	$15 65
Alameda—												
Oriental†	312	$33 35	$0 11									

Berkeley—												
Female	34			580	$472 35	$0 81	614	$472 35				
Teachers	380	$5,081 46	$13 37	818	8,269 71	10 11	1,198	13,351 17	35	$165 13		
Totals	414	$5,081 46	$12 27	1,398	$8,742 06	$6 25	1,812	$13,823 52	35	$165 13		
Fresno—												
General	4,473	$5,910 40	$1 32	242	$324 40	$1 34	4,715	$6,234 80	251	$348 45	10	$22 65
Pasadena—												
Female				646	$1,584 25	$2 45	646	$1,584 25				
Nurses				128	243 75	1 90	128	243 75				
Oriental†	273	$231 80	$0 85	7	8 90	1 27	280	240 70	2	$4 45		
Totals	273	$231 80	$0 85	781	$1,836 90	$2 35	1,054	$2,068 70	2	$4 45		
Sacramento—												
Female	3	$5 50	$1 83	448	$620 00	$1 38	451	$625 50	27	$34 25		
General	15,374	27,622 20	1 74	273	374 75	1 37	16,147	27,996 95	1,607	2,864 30	46	$80 75
Oriental†	125	369 30	2 95	4	3 40	85	129	372 70				
Totals	16,002	$27,997 00	$1 75	725	$998 15	$1 38	16,727	$28,995 15	1,634	$2,898 55	46	$80 75
San Diego—												
Female	97	$245 80	$2 53	1,428	$2,884 19	$2 02	1,525	$3,129 99	139	$252 32		
General	2,621	4,964 85	1 89	920	1,371 15	1 49	3,541	6,336 00	1,052	1,854 55		
Totals	2,718	$5,210 65	$1 92	2,348	$4,255 34	$1 81	5,066	$9,465 99	1,191	$2,106 87		
San Jose—												
General	1,009	$1,391 55	$1 38	419	$592 75	$1 41	1,428	$1,984 30	182	$268 35		
Stockton—												
General	7,496	$12,124 60	$1 62	848	$1,032 05	$1 22	8,344	$13,156 65	1,097	$1,705 00	1	$2 30
All other towns—												
Female	16	$4 65	$0 29	420	$812 00	$1 93	436	$816 65	9	$13 00		
General	10,280	13,642 20	1 33	1,625	1,743 50	1 07	11,905	15,385 70	913	1,358 06	8	$15 80
Nurses	2	8 00	4 00	96	390 00	4 06	98	398 00				
Oriental†	8,412	1,086 41	13				8,412	1,086 41	22	43 25	1	1 50
Totals	18,710	$14,741 26	$0 79	2,141	$2,945 50	$1 38	20,851	$17,686 76	944	$1,414 31	9	$17 30

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*Figures are not given for theatrical agencies, as the fees are based on duration of engagement, which is often indefinite.

†Returns from Oriental agencies are in most cases quite incomplete.

TABLE VI.—Summary of Private Employment Agencies of the State. Record for One Year Ending March 31, 1916.

City	Number of agencies	Positions furnished men			Positions furnished women			Total positions furnished		Refunds made			
										Fees refunded		Expenses refunded	
		Number	Fees charged	Average fee	Number	Fees charged	Average fee	Number	Fees charged	Number	Amount	Number	Amount
San Francisco	54	50,998	$134,057 47	$2 63	14,503	$44,383 15	$3 05	65,501	$178,440 62	19,616	$49,949 75	114	$330 70
Los Angeles	58	54,921	114,951 46	2 09	26,960	50,766 34	1 88	81,881	165,717 80	24,518	47,078 50	185	303 68
Oakland	9	1,445	3,419 08	2 37	7,488	13,420 70	1 79	8,933	16,839 78	3,334	6,081 04	9	15 65
Totals	121	107,364	$252,428 01	$2 35	48,951	$108,570 19	$2 24	156,315	$360,998 20	47,468	$103,109 29	308	$650 03
Alameda	1	312	$33 35	$0 11				312	$33 35				
Berkeley	3	414	5,081 46	12 27	1,398	$8,742 06	$6 25	1,812	13,823 52	35	$165 13		
Fresno	4	4,473	5,910 40	1 32	242	324 40	1 34	4,715	6,234 80	251	348 45	10	$22 65
Pasadena	6	273	231 80	85	781	1,836 90	2 35	1,054	2,068 70	2	4 45		
Sacramento	13	16,002	27,997 00	1 75	725	998 15	1 38	16,727	28,995 15	1,634	2,898 55	46	80 75
San Diego	13	2,718	5,210 65	1 92	2,348	4,255 34	1 81	5,066	9,465 99	1,191	2,106 87		
San Jose	4	1,009	1,391 55	1 38	419	592 75	1 41	1,428	1,984 30	182	268 35		
Stockton	7	7,496	12,124 60	1 62	848	1,032 05	1 22	8,344	13,156 65	1,097	1,705 00	1	2 30
Totals	51	32,697	$57,980 81	$1 77	6,761	$17,781 65	$2 63	39,458	$75,762 40	4,392	$7,496 80	57	$105 70
All other towns	49	18,710	14,741 26	79	2,141	2,945 50	1 38	20,851	17,686 76	944	1,414 31	9	17 30
Grand totals	221	158,771	$325,150 08	$2 05	57,853	$129,297 34	$2 25	216,624	$454,447 42	52,804	$112,020 40	374	$773 03

TABLE VII.—Summary of Private Employment Agencies of the State. Record for One Year Ending March 31, 1916, by Class of Agency.

Class of agency	Number of agencies	Positions furnished men			Positions furnished women			Total positions furnished		Refunds made			
										Fees refunded		Expenses refunded	
		Number	Fees charged	Average fee	Number	Fees charged	Average fee	Number	Fees charged	Number	Amount	Number	Amount
Commercial	16	2,176	$26,189 85	$12 04	2,938	$19,564 39	$6 66	5,114	$45,754 24	859	$2,415 55	2	$4 60
Female	25	416	1,047 95	2 52	15,736	31,350 29	1 99	16,152	32,398 24	4,032	8,063 91	--------	--------
General	95	113,192	199,385 40	1 76	14,240	22,627 00	1 59	127,432	222,012 40	26,624	49,198 82	355	702 18
Hotel	14	24,008	62,571 36	2 61	21,405	39,464 49	1 84	45,413	102,035 85	19,754	48,469 75	12	51 50
Nurses	6	158	1,445 00	9 14	2,406	2,915 25	1 21	2,564	4,360 25	32	125 00	--------	--------
Oriental†	47	18,335	23,363 16	1 27	168	299 15	1 72	18,503	23,662 31	1,465	3,753 00	4	4 95
Teachers	7	486	11,147 36	22 94	960	13,076 77	13 62	1,446	24,224 13	38	194 37	1	9 80
Theatrical*	11	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
Totals	221	158,771	$325,150 08	$2 05	57,853	$129,297 34	$2 25	216,624	$454,447 42	52,804	$112,020 40	374	$773 03

*Figures are not given for theatrical agencies, as the fees are based on duration of engagement, which is often indefinite.

†Returns from Oriental agencies are in most cases quite incomplete.

TABLE VIII. Employment Agencies of the State. List of Agencies Granted State Licenses During License Year Ending March 31, 1916.

AGENCIES IN CITIES OF FIRST, FIRST AND ONE-HALF AND SECOND CLASSES.

SAN FRANCISCO.

License No.	
14.	Andre's Employment Agency.
12.	Blake and Amber Amusement Agency.
15.	Boynton-Esterly Teachers' Agency.
16.	Business Men's Registrar Agency.
18.	California Hotels Employment Bureau.
*82.	Clerical Reference Association.
19.	Commercial Expert Company.
156.	Cosmopolitan Employment Agency.
195.	Dailey Vaudeville and Dramatic Exchange.
80.	Day, Mrs. M. E.
100.	Dillon, Josephine B.
*57.	Dixon-Fogarty Employment Agency.
10.	Duperu and Company.
69.	Empire Employment Agency.
104.	Ewer and Company, W. D.
11.	Gibbs and Company, Inc.
83.	Hotel Reporter Employment Bureau.
158.	International Employment Agency.
5.	Keeler Hotel Employment Bureau.
32.	Kennedy and Drechsler, Inc.
198.	Knight's Employment Agency.
13.	Lagarde, Nydia.
8.	Laroulandie, Mme. Louise.
103.	Levey Circuit, Bert.
*21.	Marchand's Agency.
210.	McCarthy, Mrs. Mary T.
†143.	Midgley's Hotel Managers' Exchange.
1.	Murray and Ready.
2.	Murray and Ready.
9.	Norton Employment Agency.
58.	Olcott, R. H.
115.	Pacific Audit and System Company.
174.	Pacific Teachers' Agency and Pacific Service Company.
101.	Plunkett, Miss Kate.
99.	Presidio Employment Bureau.
79.	Reliable Employment Agency.
17.	Rockhurst Center Investigated Service Bureau.
203.	Sullivan's Employment Agency.
182.	Treacy's Employment Agency.
81.	United Employing Agency.
105.	Weaver, John C.
116.	Western States Vaudeville Association.
220.	Western Vaudeville Managers' Association.

Orientals.

113.	Grant Employment Office.
209.	Hatsumi Employment Agency, Oscar.
128.	Hori & Company Employment Agency.
6.	Japan-American Employment Agency.
20.	Japanese-Chinese Employment Agency.
102.	Kinney, Charles D.
157.	Knoph, A. N.
31.	New Grant Employment Agency.
184.	Oriental Employment Agency.
7.	Shiozaki Employment Agency.
106.	Star Employment Agency.

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*Retired from business. †License canceled.

TABLE VIII. Employment Agencies of the State. List of Agencies Granted State Licenses During License Year Ending March 31, 1916—Continued.

LOS ANGELES.

License No.	
*136.	Big Four Employment Agency.
152.	Boynton-Esterly Teachers' Agency.
29.	California Commercial Service Company.
181.	California Employment Agency.
122.	California Hospital Nurses' Directory.
151.	California Teachers' Bureau.
173.	Coleman, J. W.
137.	Dady Amusement Circuit, C. Bassells.
*218.	Driscoll's Merchant and Home Service Employment Agency.
*119.	Educational Business Company.
84.	Educational Expert Company.
*200.	Fidelity Theatrical Exchange.
85.	Fisk Teachers' Agency.
26.	Hawley Employment Agency.
121.	Henderson Employment Agency.
34.	Hummel Bros. & Company.
*201.	Independent Theatrical Exchange.
33.	Inglis, Gus.
28.	International Labor Agency.
202.	Levey Vaudeville Circuit, Bert.
194.	Lyons & Beavis.
25.	Martin & Shaw.
162.	McClures Employment Bureau.
60.	Middleton Nurses' Directory.
24.	Mines Technical Agency.
3.	Murray and Ready.
87.	Nurses Central Registry.
61.	Nurses' Home and Directory.
147.	Pacific Audit and System Company.
86.	Pacific Service Company and Pacific Teachers' Agency.
30.	Park's Vaudeville Booking Exchange.
23.	Patten's Employment Agency, Mrs.
167.	Plaza Employment Agency.
163.	Progressive Household Club.
150.	Red Crossing Employment Agency.
139.	Reference Association of California.
59.	Reliable Hotel, Restaurant and Bakers' Employment Bureau.
124.	Richardson, Nina M.
62.	Rodriguez, R.
63.	Swedish and German Employment Bureau.
22.	Tourist and Hotel Reporter Employment Agency.
88.	Trimble's Employment Agency.
64.	Tucker Hotel and Restaurant Employment Agency.
161.	Walters Stenographic Company.

Orientals.

123.	A. B. Employment Agency.
131.	Abe Employment Agency, H.
89.	Eagle Japanese Employment Agency.
90.	Fuji Employment Bureau.
120.	Ibusuki Employment Agency, T.
193.	Ito's Employment Agency, H. K.
125.	Japan A. B. C. Employment Agency.
138.	Japanese Central Employment Agency.
166.	Japanese Los Angeles Employment Office.
168.	Oriental Japanese Employment Agency.
91.	Pacific Japanese A. A. A. Employment Bureau.

OAKLAND.

191.	Bonstell Employment Agency.
109.	Johnson and Kerr.
179.	Nelson's Employment Agency.
188.	Oakland Employment Agency.
178.	People's Employment Agency.
177.	Success Employment Agency.
176.	Woman's Employment Exchange.

Orientals.

187.	Japanese-Chinese Employment Agency.
216.	Yuen Employment Agency, Chas.

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*Retired from business. †License canceled.

TABLE VIII. Employment Agencies of the State. List of Agencies Granted State Licenses During License Year Ending March 31, 1916—Continued.

AGENCIES IN CITIES OF THE THIRD AND FOURTH CLASSES.

ALAMEDA.
License No.
133. Rokutani Employment Agency.

BERKELEY.
180. Berkeley Employment Bureau.
65. Fisk Teachers' Agency.
66. McNeill Teachers' Agency.

FRESNO.
67. People's Employment Agency.
40. San Joaquin Employment Agency.
41. Wright Employment Agency.

PASADENA.
208. McAdams Employment Agency, Mrs
68. Mikado Employment Agency.
70. Registry for Undergraduate Nurses.
207. Weatherton, Mrs. G.
38. Weylandt's Employment Agency, Mrs. C. J.
37. Yamato Employment Agency.

SACRAMENTO.
*117. Bradman and Gilbert Employment Agency.
148. Capital Employment Agency.
154. Central Employment Agency.
108. Hong Kong Employment Agency.
107. Ideal Employment Agency.
155. Japanese Employment Agency.
4. Marray and Ready.
185. Original California Employment Agency.
159. Pacific Coast Labor Bureau.
160. Red Cross Employment Agency.
169. Standard Employment Agency.
205. Western Labor Agency.
165. Wide Awake California Employment Agencies, Inc.

SAN DIEGO.
*164. California Employment Agency.
111. Essex Employment Agency.
*142. Golden West Employment Agency.
196. Model Employment Agency.
110. Old Reliable Employment Agency.
*145. Pacific Coast Employment Agency.
144. Pioneer Employment Agency.
*175. Plaza Employment Agency.
*140. San Diego Employment Agency.
36. Star Employment Agency.
39. Western Employment Office.
141. Woman's Social Service.
153. Young Women's Christian Association.

SAN JOSE.
*172. Anderson & Co.
170. Garden City Employment Agency.
171. Progressive Employment Agency.
192. United Employment Agency.

STOCKTON.
†183. Gateway Employment Agency.
42. Logan's Employment Agency.
92. Independent Employment Agency.
35. King's Employment Agency.
71. Reyner's Employment Agency.
72. Steele's Employment Agency.
73. Williams & Co.

AGENCIES IN ALL OTHER CITIES AND TOWNS.

BAKERSFIELD.
49. Kern Valley Employment Bureau.
*149. Home Employment Agency.
112. Whitaker Employment Agency.

BURLINGAME.
219. Capps Employment Agency.

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*Retired from business. †License canceled.

TABLE VIII. Employment Agencies of the State. List of Agencies Granted State Licenses During License Year Ending March 31, 1916—Continued.

License No.	
CARPINTERIA.	
74.	Suminaga, George.
CHICO.	
118.	Wide Awake Employment Agency.
CUCAMONGA.	
53.	Iwasaki, T.
EL CENTRO.	
48.	Pioneer Employment Agency.
EUREKA.	
190.	Hayden Employment Agency.
56.	Kerr, J. W.
47.	Metropole Employment Agency.
HOLLYWOOD.	
132.	Cherry Day Work Employment Agency.
27.	Japanese-Hollywood-Sunshine Employment Agency.
134.	Sunset Employment Agency.
LODI.	
96.	Lodi California Employment Agency.
*213.	Schutte Employment Office, Herman.
LONG BEACH.	
129.	Arks Employment Agency.
135.	Mikado Employment Agency.
94.	Panama Employment Agency.
215.	Registrar of Nurses' Central Registry.
130.	Togo Employment Agency.
MARYSVILLE.	
98.	Marysville Employment Agency.
MERCED.	
55.	Warfield, C. A. H.
MODESTO.	
54.	Modesto Employment Agency.
MONTECITO.	
214.	Japanese Employment Agency of Montecito.
NAPA.	
189.	Brandlin's Employment Agency.
OCEAN PARK.	
127.	Hollywood, The.
ONTARIO.	
186.	Narod Employment Agency.
PIRU.	
199.	Hayashida, I.
REDDING.	
75.	Northern California Employment Agency.
REDLANDS.	
146.	Rivera's Employment Agency.
RIVERSIDE.	
221.	Korean Employment Agency.
*43.	Reliable Employment Agency.
197.	Riverside Employment Agency.
SALINAS.	
50.	Shaw, Chas.
SAN BERNARDINO.	
52.	Boesenberg & Son, F.
126.	Preciado's Employment Agency, A. P.
211.	Rowan, Byron T.
217.	Tafolla, A. M.
SAN MATEO.	
97.	Lindsay, Mrs. Mary J.
SANTA ANA.	
*212.	Dean and Isenberg Employment Agency.
76.	Palace Employment Agency.
77.	Santa Ana Employment Agency.
SANTA BARBARA.	
46.	Associated Charities.
45.	Japanese Employment Agency.
114.	Santa Barbara Employment Agency.

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*Retired.

TABLE VIII. Employment Agencies of the State. List of Agencies Granted State Licenses During License Year Ending March 31, 1916—Continued.

SANTA MONICA.

License No.

93. Japanese Pacific Employment Agency.
44. Ocean Park Japanese Employment Agency.

SANTA PAULA.

204. Sakyo, Y.

SANTA ROSA.

†206. Parks Employment Agency.

TAFT.

78. Durst Employment Agency.

VISALIA.

51. Howell's Employment Agency.

WHITTIER (East).

95. Tsukifuji, Frank.

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†License canceled.

TABLE VIII-a. Employment Agencies of the State. List of Agencies Granted State Licenses During License Year Ending March 31, 1917.

(Licenses issued up to November 1, 1916.)

AGENCIES IN CITIES OF FIRST, FIRST AND ONE-HALF AND SECOND CLASSES.

SAN FRANCISCO.

License No.	
62.	Andre Employment Agency.
7.	Blake & Amber Amusement Agency.
5.	Boynton-Esterly Teachers' Agency.
34.	Business Men's Registrar Agency.
42.	California Hotels Employment Agency.
14.	Commercial Expert Company Agency.
69.	Cosmopolitan Employment Agency.
45.	Day Hotel Employment Agency, Mrs. M. E.
70.	Dillon's Employment Agency, Miss.
63.	Duperu & Co., Labor Agency.
72.	Ewer & Co. Agency, W. D.
4.	Gibbs Employment Agency.
33.	Hotel Reporter Employment Agency.
99.	International Employment Agency.
28.	Keeler Employment Agency.
103.	Kennedy & Drechsler Employment Agency.
29.	Knight's Employment Agency.
64.	Lagarde Public Stenographer Employment Agency.
59.	Louise Employment Agency, Mme.
114.	McCarthy Employment Agency, Mrs. M. T.
1.	Murray & Ready Employment Agency.
22.	Norton Employment Agency.
30.	Olcott Employment Agency.
105.	Pacific Audit and System Company Agency.
148.	Pacific Teachers' Agency and Service Company.
79.	Plunkett Employment Agency, Miss Kate.
147.	Reliable Employment Agency.
183.	Smith Employment Agency, Mary F.
6.	Sullivan's Labor Agency.
35.	Treacy's Employment Agency.
23.	United Employing Agency.
80.	Weaver Agency, J. C.
151.	West Coast Teachers' Agency.
81.	Western States Vaudeville Association Agency.
134.	Western Vaudeville Managers' Association Agency.

Orientals.

98.	Grant Employment Agency.
73.	Hatsumi Employment Agency, Oscar.
13.	Hori & Co. Employment Agency.
102.	Japan-American Employment Agency.
101.	Japanese and Chinese Employment Agency.
117.	Kinney Chinese Employment (Agency) Bureau.
43.	Knoph Employment Agency, A. N.
71.	New Grant Employment Agency.
137.	Oriental Employment Agency.
100.	Shiozaki Employment Agency.

LOS ANGELES.

142.	Big Four Employment Agency.
119.	Bonded Service Company Employment Agency.
135.	Boynton-Esterly Teachers' Agency.
168.	Bradstreet's Employment Agency.
141.	Bureau of Service Employment Agency.
120.	Business Men's Clearing House Employment Agency.
184.	C. and C. Employment Agency.
133.	California Commercial Service Employment Agency.
57.	California Hospital Nurses' Directory Agency.
178.	California Motion Picture Producers and Actors Exchange Employment Agency.
126.	California Theatrical Exchange Agency.
174.	Christy Motion Picture Association Employment Agency.
130.	Coleman Employment Agency, J. W.
177.	Commercial Clearing House Employment Agency.

TABLE VIII-a. Employment Agencies of the State. List of Agencies Granted State Licenses During License Year Ending March 31, 1917—Continued.

LOS ANGELES—Continued.

License No.

85. Educational Expert Company Employment Agency.
82. Fish Teachers' Agency.
86. Hawley Employment Agency.
88. Henderson Employment Agency.
11. Hummel Bros. Employment Agency.
89. International Labor Agency.
107. Johnson Employment Agency, Wm.
155. Lyons & Beavis Employment Agency.
66. Martin & Shaw Employment Agency.
172. Meaney & Barry Employment Agency.
106. Middleton's Nurses Registry Employment Agency.
124. Mines Technical Agency.
2. Murray & Ready Employment Agency.
10. Nurses' Central Registry Agency.
56. Nurses' Home and Directory Agency.
127. Pacific Audit and System Company, Inc., Agency.
143. Pacific Name and Address Company Employment Agency.
24. Pacific Service and Teachers' Agency.
132. Packard Theatrical Exchange and Agency.
90. Parks Vaudeville and Booking Agency.
84. Patten's Employment Agency, Mrs.
58. Red Crossing Employment Agency.
125. Reference Association of California Employment Agency.
108. Rodriguez Employment Agency, R.
87. Swedish and German Employment Agency.
12. Tourist and Hotel Reporter Employment Agency.
55. Trimble's Employment Agency.
54. Tucker's Hotel Restaurant Employment Agency.
83. Willis & Inglis Motion Picture Agency.

Orientals.

91. A. B. Employment Agency.
92. Abe Employment Agency.
131. Eagle Japanese Employment Agency.
129. Fuji Employment Agency.
110. Japan A. B. C. Employment Agency.
128. Japanese Central Employment Agency.
111. Japanese Los Angeles Employment Agency.
109. Pacific Japanese A. A. A. Employment Agency.

OAKLAND.

153. Newman's Employment Agency.
65. Oakland Employment Agency.
53. People's Employment Agency.
160. Success Employment Agency.

Orientals.

150. Japanese Chinese Employment Agency.
181. Japanese and Philippine Employment Agency.

AGENCIES IN CITIES OF THIRD AND FOURTH CLASSES.

ALAMEDA.

78. Rokutani Employment Agency.

BERKELEY.

8. Fisk Teachers' Agency.
9. McNeill Teachers' Agency.

FRESNO.

159. Farmers' Employment Agency.
140. People's Employment Agency.
17. San Joaquin Employment Agency.
182. Valley Employment Agency.
122. Wright Employment Agency.

PASADENA.

152. McAdam's Employment Agency.
60. Mikado Employment Agency.
94. Weylandt's Employment Agency, Mrs. C. J.
93. Yamato Employment Agency.

TABLE VIII-a. Employment Agencies of the State. List of Agencies Granted State Licenses During License Year Ending March 31, 1917—Continued.

SACRAMENTO.

License No.

16. Capital Employment Agency.
41. Central Employment Agency.
116. Hong Kong Employment Agency.
27. Ideal Employment Agency.
158. Japanese Employment Agency.
3. Murray & Ready Employment Agency.
169. Original California Employment Agency.
145. Pacific Coast Labor Agency.
51. Red Cross Employment Agency.
175. Standard Employment Agency.
170. Togo Employment Agency.
146. Western Labor Agency.
67. Wide Awake Employment Agency.

SAN DIEGO.

74. Essex Employment Agency.
171. International Employment Agency.
39. Model Employment Agency.
75. Old Reliable Employment Agency.
77. Pioneer Employment Agency.
40. Star Employment Agency.
38. Western Employment Agency.
76. Woman's Social Service Employment Agency.

SAN JOSE.

180. Garden City Employment Agency.
179. Progressive Employment Agency.
104. United Employment Agency.

STOCKTON.

46. Independent Employment Agency.
15. King's Employment Agency.
44. Reyner's Employment Agency.
52. Steele's Employment Agency.
154. Stockton Employment Agency.
123. Williams & Co. Employment Agency.

AGENCIES IN ALL OTHER CITIES AND TOWNS.

BAKERSFIELD.

48. Kern Valley Employment Agency.
176. Morris' Employment Agency, Edd.
26. Whitaker Employment Agency, Chas.

BURLINGAME.

49. Capps Employment Agency.

CALEXICO.

163. Fogg Employment Agency, Thos.
164. Hardesty's Employment Agency.

CARPINTERIA.

139. Suminaga Employment Agency, George.

CHICO.

136. Wide Awake Employment Agency.

CUCAMONGA.

144. Iwasaki Employment Agency, T.

EL CENTRO.

121. Pioneer Employment Agency.

EUREKA.

19. Kerr Employment Agency, J. W.
31. Metropole Employment Agency.

LODI.

68. Lodi Employment Agency.

LONG BEACH.

21. Nurses' Central Registry of Long Beach.
32. Panama Employment Agency.
113. Togo & Arks Employment Agency.

MARYSVILLE.

47. Marysville Employment Agency.

MERCED.

37. Warfield Employment Agency, C. A. H.

MODESTO.

166. Modesto Employment Agency.

TABLE VIII-a. Employment Agencies of the State. List of Agencies Granted State Licenses During License Year Ending March 31, 1917—Continued.

OCEAN PARK.
License No.
157. Proctor Employment Agency.
ONTARIO.
165. Narod Employment Agency.
RIVERSIDE.
115. Riverside Employment Agency.
SALINAS.
18. Shaw Employment Agency, Chas.
SAN BERNARDINO.
95. Boesenberg & Son Employment Agency, F.
112. Preciado's Employment Agency, A. P.
185. Rowan Employemnt Agency, Byron T.
156. Tafolla & Co. Employment Agency, A. M.
SAN MATEO.
36. Lindsay Employment Agency, Mrs. Mary J.
SANTA ANA.
167. Orange County Employment Agency.
20. Palace Employment Agency.
SANTA BARBARA.
96. Japanese Employment Agency.
138. Registrar of Associated Charities Agency.
149. Santa Barbara Employment Agency.
SANTA MONICA.
161. Japanese A. B. C. Employment Agency.
118. Japanese Pacific Employment Agency.
97. Ocean Park Employment Agency.
TAFT.
25. Durst Employment Agency.
VENICE.
162. Rose Avenue Employment Agency.
VISALIA.
50. Howell's Employment Agency.
WHITTIER (East).
61. Tsukifuji Employment Agency, Frank.

TABLE IX.—Age and Schooling Certificates Issued in the State, for Period June 25, 1914, to June 25, 1915.

(Showing sex and schooling by counties.)

County	Total certificates issued	Total (15 years)		Graduate (15 years)			Nongraduate (15 years)		
		Male	Female	Total	Male	Female	Total	Male	Female
Alameda	137	96	41	14	8	6	123	88	35
Alpine									
Amador									
Butte									
Calaveras									
Colusa									
Contra Costa	2	2		2	2				
Del Norte									
El Dorado									
Fresno	20	10	10	7	2	5	13	8	5
Glenn									
Humboldt	7	7		2	2		5	5	
Imperial									
Inyo									
Kern	2	1	1				2	1	1
Kings									
Lake									
Lassen									
Los Angeles	429	307	122	147	98	49	282	210	72
Madera									
Marin	2	2		2	2				
Mariposa									
Mendocino									
Merced									
Modoc									
Mono									
Monterey									
Napa	2	1	1				2	1	1
Nevada	1	1		1	1				
Orange									
Placer									
Plumas									
Riverside									
Sacramento	56	27	29	22	7	15	34	20	14
San Benito									
San Bernardino	3	2	1	3	2	1			
San Diego	12	12		1	1		11	11	
San Francisco	454	336	118	80	64	16	374	271	103
San Joaquin	1	1					1	1	
San Luis Obispo									
San Mateo	2	2					2	2	
Santa Barbara	2	2					2	2	
Santa Clara	12	9	3				12	9	3
Santa Cruz									
Shasta									
Sierra									
Siskiyou									
Solano	16	16		8	8		8	8	
Sonoma	2		2				2		2
Stanislaus									
Sutter									
Tehama									
Trinity									
Tulare									
Tuolumne									
Ventura	1	1		1	1				
Yolo	3	2	1	1	1		2	1	1
Yuba									
Totals	1,166	837	329	291	199	92	875	638	237

TABLE IXa.—Age and Schooling Certificates Issued in the State, for Period June 25, 1915, to June 25, 1916.

(Showing sex and schooling, by counties.)

County	Total certificates issued	Total (15 years)		Graduate (15 years)			Nongraduate (15 years)		
		Male	Female	Total	Male	Female	Total	Male	Female
Alameda	133	94	39	54	31	23	79	63	16
Alpine									
Amador									
Butte	1		1	1		1			
Calaveras									
Colusa									
Contra Costa	8	8		6	6		2	2	
Del Norte									
El Dorado									
Fresno	6	4	2				6	4	2
Glenn									
Humboldt	12	10	2	1	1		11	9	2
Imperial									
Inyo									
Kern									
Kings									
Lake									
Lassen									
Los Angeles	304	224	80	175	128	47	129	96	33
Madera	3	3					3	3	
Marin									
Mariposa									
Mendocino									
Merced									
Modoc									
Mono									
Monterey	2	2					2	2	
Napa									
Nevada	1	1					1	1	
Orange									
Placer									
Plumas									
Riverside									
Sacramento	56	25	31	27	9	18	29	16	13
San Benito									
San Bernardino	4	4		2	2		2	2	
San Diego	3	3		1	1		2	2	
San Francisco	287	219	68	93	68	25	194	151	43
San Joaquin	1	1		1	1				
San Luis Obispo									
San Mateo									
Santa Barbara									
Santa Clara	7	7					7	7	
Santa Cruz									
Shasta	1		1				1		1
Sierra									
Siskiyou									
Solano	8	8		5	5		3	3	
Sonoma									
Stanislaus									
Sutter									
Tehama									
Trinity									
Tulare									
Tuolumne									
Ventura	5	4	1				5	4	1
Yolo	1		1				1		1
Yuba									
Totals	843	617	226	366	252	114	477	365	112

TABLE X.—Permits to Work (Graduate) Issued in the State, for Period June 25, 1914, to June 25, 1915.

(Showing sex and age, by counties.)

County	Total permits issued	Male					Female				
		Total	12 years	13 years	14 years	15 years	Total	12 years	13 years	14 years	15 years
Alameda	25	23	-----	2	16	5	2	-----	1	-----	1
Alpine	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Amador	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Butte	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Calaveras	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Colusa	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Contra Costa	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Del Norte	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
El Dorado	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fresno	13	6	-----	-----	5	1	7	-----	2	1	4
Glenn	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Humboldt	8	5	-----	-----	1	4	3	-----	-----	2	1
Imperial	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Inyo	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Kern	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Kings	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Lake	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Lassen	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Los Angeles	126	88	-----	7	78	3	38	-----	5	30	3
Madera	1	1	-----	1	-----	-----	-----	-----	-----	-----	-----
Marin	1	1	-----	-----	1	-----	-----	-----	-----	-----	-----
Mariposa	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Mendocino	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Merced	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Modoc	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Mono	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Monterey	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Napa	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Nevada	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Orange	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Placer	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Plumas	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riverside	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sacramento	11	6	-----	-----	3	3	5	-----	-----	3	2
San Benito	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
San Bernardino	1	1	-----	-----	1	-----	-----	-----	-----	-----	-----
San Diego	26	22	-----	1	11	10	4	-----	-----	1	3
San Francisco	46	38	-----	4	34	-----	8	-----	-----	8	-----
San Joaquin	1	1	-----	-----	1	-----	-----	-----	-----	-----	-----
San Luis Obispo	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
San Mateo	1	1	-----	-----	1	-----	-----	-----	-----	-----	-----
Santa Barbara	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Santa Clara	8	8	-----	-----	4	4	-----	-----	-----	-----	-----
Santa Cruz	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Shasta	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sierra	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Siskiyou	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Solano	4	4	-----	-----	1	3	-----	-----	-----	-----	-----
Sonoma	2	1	-----	-----	-----	1	1	-----	-----	-----	1
Stanislaus	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sutter	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Tehama	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Trinity	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Tulare	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Tuolumne	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Ventura	1	1	-----	-----	1	-----	-----	-----	-----	-----	-----
Yolo	1	-----	-----	-----	-----	-----	1	-----	-----	1	-----
Yuba	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Totals	276	207	-----	15	158	34	69	-----	8	46	15

TABLE Xa.—Permits to Work (Graduate) Issued in the State, for Period June 25, 1915, to June 25, 1916.

(Showing sex and age, by counties.)

County	Total permits issued	Male			Female		
		Total	14 years	15 years	Total	14 years	15 years
Alameda	32	21	14	7	11	6	5
Alpine							
Amador							
Butte							
Calaveras							
Colusa							
Contra Costa	1	1	1				
Del Norte							
El Dorado							
Fresno	3	1	1		2	1	1
Glenn							
Humboldt	6	6	3	3			
Imperial							
Inyo							
Kern							
Kings	1				1	1	
Lake							
Lassen							
Los Angeles	108	80	78	2	28	28	
Madera							
Marin	1	1	1				
Mariposa							
Mendocino							
Merced							
Modoc							
Mono							
Monterey							
Napa	1	1		1			
Nevada							
Orange							
Placer							
Plumas							
Riverside							
Sacramento	10	6	6		4	4	
San Benito							
San Bernardino	1	1		1			
San Diego	25	23	18	5	2	1	1
San Francisco	44	34	34		10	10	
San Joaquin							
San Luis Obispo							
San Mateo							
Santa Barbara	1	1	1				
Santa Clara	4	3	2	1	1		1
Santa Cruz							
Shasta							
Sierra							
Siskiyou							
Solano	5	5	1	4			
Sonoma							
Stanislaus							
Sutter							
Tehama							
Trinity							
Tulare							
Tuolumne							
Ventura							
Yolo							
Yuba							
Totals	243	184	160	24	59	51	8

TABLE XI.—Permits to Work (Temporary) Issued in the State, for Period June 25, 1914, to June 25, 1915.

(Showing sex and age, by counties.)

County	Total permits issued	Male					Female				
		Total	12 years	13 years	14 years	15 years	Total	12 years	13 years	14 years	15 years
Alameda	49	35	1	-----	28	6	14	-----	2	9	3
Alpine	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Amador	1	1	-----	-----	1	-----	-----	-----	-----	-----	-----
Butte	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Calaveras	3	2	1	1	-----	-----	1	-----	-----	-----	1
Colusa	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Contra Costa	2	2	-----	1	-----	1	-----	-----	-----	-----	-----
Del Norte	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
El Dorado	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fresno	20	12	-----	1	7	4	8	-----	2	3	3
Glenn	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Humboldt	1	1	-----	-----	1	-----	-----	-----	-----	-----	-----
Imperial	1	-----	-----	-----	-----	-----	1	-----	-----	1	-----
Inyo	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Kern	2	1	1	-----	-----	-----	1	-----	-----	1	-----
Kings	6	5	1	3	-----	1	1	1	-----	-----	-----
Lake	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Lassen	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Los Angeles	85	55	5	15	34	1	30	3	5	22	-----
Madera	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Marin	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Mariposa	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Mendocino	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Merced	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Modoc	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Mono	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Monterey	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Napa	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Nevada	2	-----	-----	-----	-----	-----	2	-----	-----	1	1
Orange	1	1	-----	-----	1	-----	-----	-----	-----	-----	-----
Placer	1	1	-----	-----	1	-----	-----	-----	-----	-----	-----
Plumas	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Riverside	2	2	-----	-----	2	-----	-----	-----	-----	-----	-----
Sacramento	31	27	1	3	22	1	4	-----	1	3	-----
San Benito	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
San Bernardino	2	2	-----	-----	2	-----	-----	-----	-----	-----	-----
San Diego	82	76	6	16	28	26	6	-----	1	4	1
San Francisco	135	108	7	21	80	-----	27	-----	1	3	23
San Joaquin	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
San Luis Obispo	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
San Mateo	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Santa Barbara	2	1	-----	-----	1	-----	1	-----	-----	1	-----
Santa Clara	3	2	-----	-----	2	-----	1	-----	-----	1	-----
Santa Cruz	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Shasta	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sierra	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Siskiyou	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Solano	9	9	-----	2	6	1	-----	-----	-----	-----	-----
Sonoma	2	-----	-----	-----	-----	-----	2	-----	-----	2	-----
Stanislaus	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sutter	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Tehama	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Trinity	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Tulare	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Tuolumne	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Ventura	6	6	1	2	2	1	-----	-----	-----	-----	-----
Yolo	1	1	1	-----	-----	-----	-----	-----	-----	-----	-----
Yuba	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Totals	449	350	25	65	218	42	99	4	12	51	32

TABLE XIa.—Permits to Work (Temporary) Issued in the State, for Period June 25, 1915, to June 25, 1916.

(Showing sex and age, by counties.)

County	Total permits issued	Male			Female		
		Total	14 years	15 years	Total	14 years	15 years
Alameda	51	34	28	6	17	11	6
Alpine							
Amador							
Butte							
Calaveras							
Colusa							
Contra Costa	4	3	2	1	1	1	
Del Norte							
El Dorado							
Fresno	11	5	3	2	6	4	2
Glenn							
Humboldt	1				1		1
Imperial							
Inyo							
Kern	2	2	1	1			
Kings							
Lake							
Lassen							
Los Angeles	36	28	15	13	8	6	2
Madera	1	1		1			
Marin							
Mariposa							
Mendocino							
Merced							
Modoc							
Mono							
Monterey	1	1	1				
Napa	3	2	2		1	1	
Nevada							
Orange	2	1		1	1		1
Placer							
Plumas							
Riverside							
Sacramento	18	11	11		7	7	
San Benito							
San Bernardino	4	3	3		1		1
San Diego	39	37	24	13	2	1	1
San Francisco	213	176	90	86	37	12	25
San Joaquin							
San Luis Obispo							
San Mateo							
Santa Barbara	3	2	1	1	1		1
Santa Clara	5	4	1	3	1		1
Santa Cruz							
Shasta							
Sierra							
Siskiyou							
Solano	4	4	3	1			
Sonoma	1				1		1
Stanislaus							
Sutter							
Tehama							
Trinity							
Tulare							
Tuolumne	1	1	1				
Ventura	2	1		1	1	1	
Yolo	2	2	2				
Yuba							
Totals	404	318	188	130	86	44	42

TABLE XII.—Age and Schooling Certificates Issued in the State, for Period June 25, 1914, to June 25, 1915.

(Showing sex and schooling, by countries of birth.)

Country of birth	Total graduate and nongraduate			Graduate			Nongraduate		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
California	503	380	123	140	105	35	363	275	88
Rest of U. S.	410	308	102	119	79	40	291	229	62
Austria-Hungary	14	9	5	3	2	1	11	7	4
British Isles	42	33	9	8	5	3	34	28	6
Canada	13	11	2	3	3	-------	10	8	2
France	4	3	1	1	-------	1	3	3	-------
Germany	10	8	2	1	1	-------	9	7	2
Italy	50	22	28	2	-------	2	48	22	26
Mexico	12	8	4	2	2	-------	10	6	4
Russia	42	17	25	7	1	6	35	16	19
Scandinavia	5	4	1	1	-------	1	4	4	-------
Spain	6	4	2	-------	-------	-------	6	4	2
Miscellaneous	55	30	25	4	1	3	51	29	22
Totals	1,166	837	329	291	199	92	875	638	237

TABLE XIIa.—Age and Schooling Certificates Issued in the State, for Period June 25, 1915, to June 25, 1916.

(Showing sex and schooling, by countries of birth.)

Country of birth	Total graduate and nongraduate			Graduate			Nongraduate		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
California	379	286	93	157	113	44	222	173	49
Rest of U. S.	316	230	86	164	110	54	152	120	32
Austria-Hungary	15	12	3	6	5	1	9	7	2
British Isles	19	15	4	6	5	1	13	10	3
Canada	13	10	3	4	3	1	9	7	2
France	1	1	-------	-------	-------	-------	1	1	-------
Germany	6	5	1	3	2	1	3	3	-------
Italy	27	19	8	3	2	1	24	17	7
Mexico	7	3	4	6	2	4	1	1	-------
Russia	25	15	10	10	5	5	15	10	5
Scandinavia	6	3	3	3	2	1	3	1	2
Miscellaneous	29	18	11	4	3	1	25	15	10
Totals	843	617	226	366	252	114	477	365	112

TABLE XIII.—Permits to Work (Graduate) Issued in the State, for Period June 25, 1914, to June 25, 1915.

(Showing sex, by countries of birth.)

Country of birth	Total	Male	Female
California	115	91	24
Rest of United States	133	98	35
Austria-Hungary	2	2	----------
British Isles	5	4	1
Canada	2	1	1
Germany	4	3	1
Italy	1	----------	1
Mexico	1	1	----------
Russia	2	----------	2
Scandinavia	2	1	1
Spain	1	1	----------
Miscellaneous	8	5	3
Totals	276	207	69

TABLE XIIIa.—Permits to Work (Graduate) Issued in the State, for Period June 25, 1915, to June 25, 1916.

(Showing sex, by countries of birth.)

Country of birth	Total	Male	Female
California	89	72	17
Rest of United States	129	97	32
Austria-Hungary	1	1	----------
British Isles	6	3	3
Canada	2	2	----------
Germany	1	1	----------
Italy	4	3	1
Russia	3	1	2
Scandinavia	1	----------	1
Miscellaneous	7	4	3
Totals	243	184	59

TABLE XIV.—Permits to Work (Temporary) Issued in the State, for Period June 25, 1914, to June 25, 1915.

(Showing sex, by countries of birth.)

Country of birth	Total	Male	Female
California	208	176	32
Rest of United States	182	135	47
Austria-Hungary	4	1	3
British Isles	11	10	1
Canada	1	1	----------
France	3	2	1
Germany	5	3	2
Italy	13	9	4
Mexico	2	1	1
Russia	4	1	3
Scandinavia	1	1	----------
Spain	1	----------	1
Miscellaneous	14	10	4
Totals	449	350	99

TABLE XIVa.—Permits to Work (Temporary) Issued in the State, for Period June 25, 1915, to June 25, 1916.

(Showing sex, by countries of birth.)

Country of birth	Total	Male	Female
California	199	156	43
Rest of United States	134	112	22
Austria-Hungary	2	2	----------
British Isles	9	8	1
Canada	2	2	----------
France	2	1	1
Germany	1	1	----------
Italy	17	8	9
Mexico	9	8	1
Russia	4	2	2
Scandinavia	2	2	----------
Spain	2	2	----------
Miscellaneous	21	14	7
Totals	404	318	86

TABLE XV.—Permits to Work (Temporary) Issued in the State, for Period June 25, 1914, to June 25, 1915.

(Showing period of time for which issued.)

Period of time for which issued	Total	Male	Female
Under 1 month	9	3	6
1 month and over, but under 3 months	71	50	21
3 months and over, but under 6 months	67	55	12
6 months	279	227	52
Not stated	23	15	8
Totals	449	350	99

TABLE XVa.—Permits to Work (Temporary) Issued in the State, for Period June 25, 1915, to June 25, 1916.

(Showing period of time for which issued.)

Period of time for which issued	Total	Male	Female
Under 1 month	9	6	3
1 month and over, but under 3 months	22	13	9
3 months and over, but under 6 months	45	39	6
6 months	290	233	57
Not stated	38	27	11
Totals	404	318	86

TABLE XVI.—Complaints for Violation of Eight-Hour Law for Women Filed With Bureau and Investigated During Fiscal Year Ending June 30, 1916.

(Showing industries against which complaints were filed.)

Industries	Total for state	San Francisco office	Los Angeles office	Sacramento office	San Diego office
Automobile dealers	1		1		
Bakeries	14	6	4	4	
Candy and confectionery	20	8	10		2
Canning and packing	2		1		1
Cleaning and dyeing	5	2	1		2
Dry goods, clothing, etc., stores	19	6	11	2	
Exposition, general	6	6			
Exposition, concessions	2	2			
Grocery stores and markets	10		8	2	
Hairdressing parlors	4	3	1		
Hospitals and sanitaria	35	21	12		2
Hotels, apartment and boarding houses	179	75	72	24	8
Laundries	38	22	13	1	2
Manufacturing, general	24	12	12		
Millinery	8	6	2		
Offices, general	3		2	1	
Photograph galleries	4	2	2		
Printing and publishing	4	3	1		
Public service corporation	4		4		
Restaurants	126	43	56	8	19
Retail stores, general	42	31	8	2	1
Tailoring and dressmaking	29	9	20		
Theaters	15	6	8		1
Unclassified	28	26	1		1
Totals	622	289	250	44	39

TABLE XVII.—Complaints for Violation of Eight-Hour Law for Women Filed With Bureau and Investigated During Fiscal Year Ending June 30, 1915.

(Showing industries against which complaints were filed.)

Industries	Total for state	San Francisco office	Los Angeles office	Sacramento office	San Diego office
Automobile dealers	1	1			
Bakeries	23	16	7		
Candy and confectionery	24	11	10	1	2
Canning and packing	7	5	1	1	
Cleaning and dyeing	13	12	1		
Dry goods, clothing, etc., stores	32	13	13	5	1
Exposition, concessions	8	6			2
Exposition, general	6	6			
Grocery stores and markets	18	11	3	2	2
Hairdressing parlors	6	5			1
Hospitals and sanitaria	36	26	7	2	1
Hotels, apartment and boarding houses	171	100	51	13	7
Laundries	33	11	17	1	4
Manufacturing, general	21	8	13		
Millinery	5	5			
Offices, general	13	6	4	3	
Photograph galleries	4	4			
Printing and publishing	3	2	1		
Public service corporations	6	4	2		
Restaurants	109	35	50	9	15
Retail stores, general	54	34	18	2	
Tailoring and dressmaking	12	6	6		
Theaters	6	1	5		
Unclassified	19	7	8	2	2
Totals	630	335	217	41	37

TABLE XVIII.—Record of Complaints Filed With Bureau and Investigated During Fiscal Year Ending June 30, 1916.

Nature of complaint	Total for state	San Francisco office	Los Angeles office	Sacramento office	San Diego office
Blowers	24	23	1	--------	--------
Child labor	141	79	50	3	9
Eight hour law—public work	41	14	16	8	3
Eight hour law—underground work	14	7	1	6	--------
Eight hour law—women	622	289	250	44	39
Employment agencies—license	35	11	22	2	--------
Employment agencies—misrepresentation	846	246	237	319	44
Medical cabinet law	36	36	--------	--------	--------
Nonpayment of wage law	10,167	3,594	4,001	2,098	474
Pay check law	4	--------	--------	3	1
Regular pay day	3	--------	--------	2	1
Sanitation	55	34	19	--------	2
Scaffolding, flooring, etc.	48	30	13	--------	5
Seats for females	10	--------	7	--------	3
Semimonthly pay day	100	46	23	31	--------
Ten hour law for drug clerks	5	--------	4	--------	1
Weekly day of rest	3	3	--------	--------	--------
Miscellaneous	212	157	26	26	3
Totals	12,366	4,569	4,670	2,542	585

TABLE XIX.—Record of Complaints Filed with Bureau and Investigated During Fiscal Year Ending June 30, 1915.

Nature of complaint	Total for state	San Francisco office	Los Angeles office	Sacramento office	San Diego office
Blowers	3	3	--------	--------	--------
Child labor	108	53	39	12	4
Eight hour law—public work	42	22	12	5	3
Eight hour law—underground work	8	2	2	2	2
Eight hour law—women	623	335	210	41	37
Employment agencies—license	39	23	11	4	1
Employment agencies—misrepresentation	1,035	438	290	259	48
Nonpayment of wage law	9,320	3,347	3,475	2,010	488
Pay check law	20	16	--------	4	--------
Regular pay day	8	8	--------	--------	--------
Sanitation	52	24	16	11	1
Scaffolding, flooring, etc.	94	66	12	3	13
Seats for females	5	5	--------	--------	--------
Ten hour law for drug clerks	6	4	2	--------	--------
Weekly day of rest	9	9	--------	--------	--------
Miscellaneous	76	61	4	11	--------
Totals	11,448	4,416	4,073	2,362	597

TABLE XX.—Record of Prosecutions Conducted by Bureau During Two Fiscal Years Ending June 30, 1916.

Nature of offense	Fiscal year 1915-16				Fiscal year 1914-15			
	Number of prosecutions	Disposition of cases			Number of prosecutions	Disposition of cases		
		Convicted	Dismissed	Pending		Convicted	Dismissed	Pending
Child labor law	7	6	1	-----	4	3	1	-----
Eight hour law for women	24	18	6	-----	8	5	3	-----
Employment agency—misrepresentation	2	2	-----	-----	13	12	1	-----
Employment agency—license	5	5	-----	-----	6	3	3	-----
Misrepresentation as to strikes	6	4	2	-----	-----	-----	-----	-----
Obtaining labor by false pretenses	-----	-----	-----	-----	1	-----	1	-----
Pay check law	14	8	6	-----	5	5	-----	-----
Payment of wage law	41	13	25	3	27	*6	20	1
Payment of wages—seasonal law	-----	-----	-----	-----	1	-----	1	-----
Prohibited employment of children	-----	-----	-----	-----	1	1	-----	-----
Scaffolding, flooring, etc., laws	1	1	-----	-----	12	10	2	-----
Withholding wages on public works	-----	-----	-----	-----	1	-----	1	-----
Totals	100	57	40	3	79	45	33	1

*One case in San Francisco carried to Appellate Court—law declared unconstitutional. Amended Stats. 1915, chap. 143.

PART II.

PUBLIC EMPLOYMENT BUREAUS.

Financial Statement.

(Showing total expenditures and unit cost of filling positions, by offices, from February 1, 1916, to October 31, 1916.)

	Superintendent's office	San Francisco	Oakland	Sacramento	Los Angeles	Total
Salaries	$2,091 86	$6,511 18	$1,913 28	$2,667 45	$2,440 52	$15,624 29
Traveling expense	212 75	136 70	14 80	156 30	581 65	1,102 20
Office rent	225 00	1,520 00	585 00	380 00		2,710 00
Janitor service		202 50	65 70	31 25		299 45
Subscriptions		30 25	70	8 90		39 85
Postage and express	140 60	222 54	100 86	80 00		544 00
Telephone and telegraph	72 15	408 90	106 79	198 83		786 67
Printing	153 40	512 98	199 50	156 75	20 71	1,043 34
Other office expense	21 86	264 32	56 63	53 60		396 41
Fixtures		937 18	135 90	206 51		1,279 59
Equipment	1,140 64	727 33	294 67	239 04	992 38	3,394 06
Total cash expended	$4,058 26	$11,473 88	$3,473 83	$4,178 63	$4,035 26	$27,219 86
Pro rata of superintendence		2,029 13	913 11	913 11	202 91	
Gross cost per operating office		$13,503 01	$4,386 94	$5,091 74	$4,238 17	$27,219 86
Estimated present value of equipment and fixtures		1,741 00	475 02	396 54	707 22	3,319 78
Net cost per operating office		$11,762 01	$3,911 92	$4,695 20	$3,530 95	$23,900 08
Number positions filled		15,101	5,427	6,435	11,587	38,550
Cost per position filled		$0.779	$0.721	$0.73	$0.305	$0.62

933 Mission Street, San Francisco,
December 9, 1916.

Hon. John P. McLaughlin, *Labor Commissioner,*
948 Market Street,
San Francisco, California.

Sir: I have the honor to submit herewith for your consideration the First Report of the Public Employment Bureaus, covering the period from February 1 to October 31, 1916.

Respectfully,

C. B. SEXTON,
Superintendent of Bureaus.

FIRST REPORT OF THE PUBLIC EMPLOYMENT BUREAUS OF THE STATE OF CALIFORNIA.

Comprising the period from February 1, 1916, to October 31, 1916.
Operated under the direction of John P. McLaughlin, Labor Commissioner.

OFFICES OPERATED.

San Francisco.

Men's Department, 933 Mission street.
Women's Department, Pacific Building.

Oakland.

Men's Department, 401 Tenth street.
Women's Department, 401 Tenth street.

Sacramento.

Men's Department, 124 K street.
Women's Department, Forum Building.

Los Angeles (State-City).

Men's Department, 206 Franklin street.
Women's Department, 207 South Broadway.
By
C. B. Sexton, Superintendent of Bureaus,
933 Mission street, San Francisco.

REPORT OF SUPERINTENDENT.

LAW CREATING PUBLIC EMPLOYMENT BUREAUS.

The act authorizing these bureaus became a law August 8, 1915, but inasmuch as only $50,000 was appropriated for the establishment and operation for two years of offices in San Francisco, Los Angeles, Sacramento and Oakland, the Labor Commissioner was confronted with the problem of complying with the law and making both ends meet.

When it is borne in mind that Los Angeles was spending over $15,000 yearly on the municipal office, it looked as if a similar office in San Francisco would take the major part of the appropriation. However, it seemed a waste of money to start a competing office in Los Angeles, particularly as the federal government was also operating an office there, so, after a conference and some correspondence on the subject, the Labor Commissioner concluded an arrangement whereby the state would act jointly with the city of Los Angeles in the operation of the existing office there. Knowing our expense from this source, some close figuring proved just when the offices could be opened and run continuously until June 30, 1916.

OPENING OF OFFICES.

On February 1, 1916, the San Francisco and Sacramento offices were opened, and the arrangement with Los Angeles went into effect. The Oakland office, which is a joint one for males and females, was opened February 3d, at the corner of Tenth and Franklin streets. For statistical purposes the Oakland office includes the cities of Berkeley and Alameda.

In San Francisco, the men's department is located on the ground floor at 933 Mission street, with a side entrance on Mary street, and the women's and the commercial department in three rooms on the second floor of the Pacific Building, at the corner of Fourth and Market streets.

In Sacramento, the men's department is located on the ground floor at 124 K street, and for the women's department, a room was secured on the fifth floor of the Forum Building.

The joint state and municipal offices in Los Angeles are as follows:

Commercial Division—111 Merchants Trust Building.
Men's Industrial Division—206 Franklin street.
Household Division—121 Merchants Trust Building.

ARRANGEMENT WITH LOS ANGELES.

Under the agreement with Los Angeles the state appoints two solicitors with Ford automobiles, who tour the district soliciting business and advocating the principle of free employment bureaus. The superintendent of the municipal office receives a small monthly sum from the state in addition to his salary from the city, and the state receives credit for all positions filled in the district outside the city limits of Los Angeles. The district is made up of the eight southern counties of Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara and Ventura.

AIMS AND POLICIES.

Unlike one of the state bureaus in the East, we consider ourselves in competition with the fee agencies, and as long as men and women have to pay for the opportunity of getting employment, we must assume the position as direct competitor of the private agencies. No employment is created by reason of the state's going into the employment agency business, nor do we solve any unemployment problems. We have a big problem on our hands, and have a public service to perform in enabling employers to get in touch with the right kind of help, and at the same time save yearly to labor the enormous sum of approximately $500,000 paid in fees to private agencies throughout the state of California. Personally, we think that all side issues, such as vocational guidance, should be shelved until the state has a monopoly of the employment agency business. When employers in a given locality have practically only one place to go for their help, instead of fifty or more as they now have, it will be much easier and less expensive to the state to place young men and women in positions which their natural ability and training qualify them to fill.

A public employment bureau may have many suitable applicants for good positions, but if the fee agencies get 90 per cent of all orders almost any applicant willing to pay the necessary fee gets the position and upsets the well-laid plans of the public bureaus. It takes time to interview applicants and find out their capabilities, and time is money, even to the state, because in the last analysis the cost of placing applicants will always be a deciding factor as to whether or not the public bureaus justify their existence.

RELATION TO CHARITY.

At the start we decided to have a plain understanding with the charitable organizations, and convince them that both of us have our separate spheres of usefulness. We realized that if we were to continue in business and be a successful public service enterprise we would have to run on the merit basis only, *i. e.*, send the best person on each order from every employer.

The different charity boards, most of which are run by business men and women, were quick to see our point of view, and we have not been importuned to place anybody unable to do the work. However, we do assist the charities to the extent of getting positions for many able-bodied men who do not have the necessary fee to pay for a position, and we are reminded of several instances where we have been thanked and assured by the successful applicants that they were down to their last cent when we placed them.

Our offices as now organized, could be used by the different cities in times of industrial depression, should it ever be necessary to start some public project in order to give relief to the unemployed. With the addition of about one clerk to carry out the program as outlined by a municipality, any emergency relief work could be taken care of.

STATISTICS.

The tables presented in this report have been made up with a view of showing the progress of each office month by month. They are interesting as showing the amount of detail in connection with each office. For instance, in the nine months under consideration, Sacramento filled about 20 per cent more positions than Oakland, but Oakland had more than double the number of customers, and received 80 per cent more orders than Sacramento. Two features that have a vital bearing on the usefulness of employment bureaus are the data showing the new employers, and the number of individuals served each month.

These tables are further enlarged on in the written matter accompanying them.

FORMS.

Standard forms similar to those in use in states where the public employment business is past the experimental stage, were adopted at the start. We soon made some changes, however, the most radical being our interpretation of a ''renewal,'' of which mention is made later, and putting the occupation at the top of the order card, which necessitates the eventual filing of the card by the kind of help wanted. We consider this an advantage, inasmuch as we have all the positions of each kind together, and the information, such as wages paid and where sent to, is always available, even if not published. Furthermore, as weekly reports of positions filled, by occupations, are made to the superintendent's office, it serves as a means for a quick check on the different offices when an inspection is made. If ten blacksmiths are reported placed in a given time, a reference to the order cards under ''blacksmiths'' should check at once. We also maintain a separate ''ledger'' card, were all of each employer's orders are listed consecutively.

By putting a one-cent postage stamp on our introductory and return postal card, we have had more success than we anticipated in getting returns from this source, as will be noted from remarks under "positions filled."

REGISTRATION.

It has been the practice to designate about three hours per day for registering applicants, equally divided between morning and afternoon. However, no applicant is discriminated against because of not being registered, but it saves the time of the clerk if an applicant has been registered when application is made for any particular job.

The tables we have drawn from the registrations as to nativity and citizenship, marital condition and duration of residence, represent more nearly the actual truth than such tables generally do. As a rule, these data are taken during times of great depression when some special work is being planned to relieve the existing condition. The men then get the impression that residents or married men are to get the preference, and the facts are generally distorted. On the other hand, our data were all taken during normal times with work fairly plentiful.

RENEWALS.

We have considered a "renewal" as being connected with "positions filled," and not with "registrations." To be exact, a renewal with us is when an applicant is placed in any position after his first position. The exact number of individuals served by any or all of our offices can be told at any time by subtracting the renewals from the positions filled. When these bureaus first started there were so many things for the clerks to familiarize themselves with that it took some time to get things running smoothly, and in order to see that the renewal feature was being properly kept, an actual count of all the cards was made on July 31, 1916, at the San Francisco, Oakland and Sacramento offices. The result has been put in tabular form below, and is interesting as showing just how many persons received from one to fifteen positions during the period of six months.

PUBLIC EMPLOYMENT BUREAUS.

Showing Number of Positions Received by Different Individuals From February 1, 1916, to July 31, 1916.

Positions received	Office			Total		
	San Francisco	Oakland	Sacramento	Individuals served	Renewals	Positions furnished
1	5,553	1,426	1,551	8,530		8,530
2	592	254	231	1,077	1,077	2,154
3	183	103	54	340	680	1,020
4	106	40	32	178	534	712
5	33	26	15	74	296	370
6	11	26	3	40	200	240
7	9	13	4	26	156	182
8	8	4	1	13	91	104
9	4	7	4	15	120	135
10	2	10		12	108	120
11		5		5	50	55
12	1	2	1	4	44	48
13		2		2	24	26
14	3			3	39	42
15		2	1	3	42	45
Totals	6,505	1,920	1,897	10,322	3,461	13,783

From the above figures it can be readily seen that if the renewals are accurately kept the individuals served are automatically accounted for. As a justification for differing with the majority of the public employment offices, with whom a renewal is taken as a re-registration, we consider it is much better for us to know what we are doing than to know what we might do. Our records show how many persons each and every office has served for any given period, and also show daily whether any office is serving new applicants or only the same circle of people.

One of the serious defects in most public employment records is their failure to show just how many individuals receive the large number of positions they report as being filled. On the other hand, re-registration simply shows how many persons are back again awaiting another position, and whom the office might serve if it had the necessary positions open.

POSITIONS COUNTED AS FILLED.

At the outset, it was aimed to count as filled only those positions where we had absolute knowledge of the applicant's obtaining employment. This practice has been adhered to throughout, and the employers have been fairly consistent in returning our stamped introductory card or giving us the information when asked for over the telephone. More cards are returned from the males sent out than from the females, due to the fact that a great many women fold the card and put it in their purse, and it is in no condition to mail back if the employer were so inclined.

During the months of July, August and September the men's department of the San Francisco office placed 5,638 applicants, and a count of the introductory cards showed 2,542 returned by the employers, 2,175 of whom were hired; and 1,161 brought back by applicants, 479 of whom were hired. During this same period 1,501 applicants, mostly in groups, were shipped from the different depots personally by our representatives. The balance of the positions filled were from knowledge of the applicants' being hired by the employer at our office, or being apprised over the telephone that the applicant had been taken on.

KIND OF POSITIONS FURNISHED.

A glance at the list of positions filled will show almost every known occupation represented. That we have succeeded in placing male applicants to positions above the grade of common laborer, and female applicants to positions outside domestic service can be attested by the following figures:

	Placements
Males—	
Laborers	15,661
Movies	3,662
All others	14,131
Total	33,454
Females—	
Cooks, domestics, etc.	2,070
Movies	537
All others	2,489
Total	5,096
Grand total	38,550

Our least progress has been in the clerical line, and it is for this class in particular that employers should patronize our bureaus to the exclusion of the fee agencies. For the first five months of the operation of the bureaus 1,704 persons registered for clerical positions, but we were able to place only 129.

Private agencies charge 30 per cent of the first month's salary for clerks of both sexes, and during the next six months a special effort will be made to strengthen this end of the business. Later on a special commercial department should be opened in San Francisco. This department has met with success in Los Angeles, and it should do equally well in San Francisco.

PERMANENCY OF POSITIONS.

While no actual figures are published this time as to the duration of the positions furnished applicants, our report shows that, excluding

4,199 positions with motion picture concerns, practically 47 per cent of the parties were sent outside the cities in which the offices are located. Inasmuch as all of the state's portion of the Los Angeles business is out-of-town business, if we consider only the three offices operated entirely by the state the proportion is still over 39 per cent.

No applicant will go out of town to accept a position for only a few days, and this in itself would be a good showing. However, the in-town positions were nearly all such as an applicant would have to pay a regular fee for heretofore; in fact, it is in no spirit of exaggeration when we claim to have jumped right into the middle of the private employment agency business, probably more so than any other public employment bureaus in the United States.

COST OF POSITIONS.

For the nine months ending October 31, 1916, the unit cost of filling each position was 62.0 cents. The cost ranged from 30.5 cents for the Los Angeles office to 77.9 cents for the San Francisco office. On account of the arrangement with Los Angeles City, whereby the state is saved the expense of maintaining an office there, the cost per placement averages only 30.5 cents in Los Angeles. However, for the three offices maintained entirely by the state, the average cost of each position furnished was 75.6 cents. This cost of 75.6 cents is lower than state bureaus in the East, where efficient records are kept, and considering the class of positions furnished here no very material reduction can be expected without sacrificing the records, unless the fee agencies are abolished. In this case the increased volume of business would allow of a material reduction in the cost of placing applicants.

It is true we expect to increase our business the coming year, but, inasmuch as practically all of the employees have been devoting considerable overtime to their work in order to make the bureaus a success, more help will be needed, and the cost will not be reduced to correspond with the figures given out by small bureaus where the positions furnished are for practically hour work, or day work at the most. Figures carefully compiled in the office of the Bureau of Labor Statistics show that the average fee of the private agencies, excluding teachers' agencies, amounts to about $1.90 for placing each individual, and the records of the private agencies do not begin to compare with the records kept by these bureaus.

ADVERTISING.

No money was paid out directly by the bureaus for advertising in newspapers or periodicals. At the outset about 3,000 circular letters were mailed to the large employers of labor in California, and every month a bulletin is sent to the papers throughout the state telling just what the bureaus are accomplishing. The papers in general have given us good notices, and no small part of our success is due to the publicity received in this manner.

The press of the state is to be thanked for its cooperation in the matter of publicity, particularly those publications which have run our advertisement of positions without cost to the bureau.

PATRONS.

The first month was rather slow work, over 5,300 registering in San Francisco, Oakland and Sacramento, and only 409 being applied for. Each month showed an improvement, however, as we became known and were making good. Some employers on being solicited gave us a tryout order rather skeptically, and eventually gave us all their business. At the end of nine months we had 8,206 employers listed on our employers' ledger.

Our list of patrons now includes many of the large firms and public service corporations. It is gratifying to note that many of the large employers have sent us recommendations commending the service of the bureaus.

RECOMMENDATIONS.

To render more efficient service in Sacramento it would be well if the male and female departments would be brought together in a ground-floor corner, but the difficulty has been to get a suitable location.

For San Francisco a commercial department should be organized with a competent person in charge, and a day-workers' department for females would also improve the service there. Of course, if the fee employment agencies are abolished in the near future, or bureaus are established in several more cities of the state, some radical changes will be necessary, all of course depending on how much money is appropriated for the bureaus.

DIRECT CONTACT WITH OFFICE NECESSARY.

Although these bureaus are maintained by the state of California, and all residents are entitled to the use of the offices, one of the greatest difficulties we have had to contend with is how to handle applicants living outside the towns in which offices are maintained. In a great many cases the employers want to interview several applicants, and the wages, hours of work and living conditions have to be explained so there will be no misunderstanding. When an out-of-town applicant writes that he wants to go on a particular job, we can not ask him to pay his way to town on the chance that the employer may take him. If an applicant spent time and money on a fruitless effort he would naturally hold the office to blame, so in practice we have found that the applicant on hand generally lands the job, and each particular office is maintained practically for the benefit of the residents of that town. The only remedy apparent is to provide offices for those towns where two or more fee agencies have found it profitable to exist.

REDUCED TRANSPORTATION RATES FOR WORKERS.

Since 1912 there has been an arrangement in effect whereby employees of seasonal resorts have been granted a half-fare from point of employment to their work, and a good number take advantage of this privilege every year.

The Labor Commissioner has been of the opinion that this would be a good measure to apply to all workers, irrespective of any particular class. It would be a benefit to employers as well as employees, as many employers each year have to advance transportation. In some cases this money advanced is deducted from the employee's salary, but in a good many instances the fare is absorbed by the employer conditional upon the employee's continuing work for a stated period.

During the cotton season just closed in Imperial Valley the growers had petitioned our bureau to help them out in getting pickers for their cotton. Our representative made his headquarters in the valley, but first found it was necessary to do something in the way of getting reduced transportation. He finally succeeded in getting half rates twice a week for parties of ten or more, and thereby greatly helped the cotton growers.

If some permanent arrangement were effected with the railroads for smaller groups, or even for individuals, it would be a step in the right direction towards helping out the seasonal agricultural industries throughout the state. One of the greatest drawbacks at present is to get help to pay a fairly stiff fare for a short job, and the producer suffers accordingly.

RULES FOR CONDUCT OF OFFICES.

In accordance with the law creating the bureaus, the Labor Commissioner has adopted the following rules to govern in the conduct of the bureaus:

No fees, direct or indirect, shall in any case be taken from applicants seeking employment. Any person connected with the bureaus who directly or indirectly charges or receives any fee or other remuneration in the performance of his duties will be summarily dismissed from the service, and shall be disqualified from holding further connection with the bureaus.

No applicant shall be discriminated against because of his religious or political belief, nor shall membership in any religious, political or social society secure for an applicant any advantages over other applicants for work.

The bureaus shall keep a strictly neutral course as regards strikes and lockouts. On all orders received from employers against whom a strike or lockout is in existence, notice of such strike or lockout shall be put on the face of the order and listed on blackboard. No special inducements shall be made to get persons to accept employment in such cases. Full information shall be given to all applicants regarding the existence of such strike or lockout, and no person shall suffer any disqualification or be otherwise prejudiced on account of refusing to accept employment under such conditions. Should an applicant decide to accept service where a strike or lockout exists, his introductory card should have the information that there is a strike or lockout on, as the case may be, and the applicant in such cases must sign a statement to the effect that working conditions have been satisfactorily explained by the bureau.

Applicants shall be registered at stated hours each day as prescribed by the superintendent of bureaus, and uniform courtesy must be shown all applicants who seek information as to positions open.

These bureaus reserve the right to send out the applicants who they think are best fitted to perform the duties of the position to be filled.

ANALYSIS OF STATISTICAL TABLES.

PUBLIC EMPLOYMENT BUREAUS.

Number of Applications for Help From Employers and Number of Employers Patronizing Offices, From February 1, 1916, to October 31, 1916.

TABLES No. 1 to No. 5, inclusive.

TABLE No. 1.—*San Francisco.* Of the 9,352 applications for help, 7,047, or 75.4 per cent, were from employers in San Francisco, and 2,305, or 24.6 per cent, from outside San Francisco. The greatest demand was made in August, when 1,571 applications were made to the offices. A total of 3,715 individual employers made use of the offices, 776 of whom gave their first order in the banner month of June. Each employer averaged 2.52 orders, and applied for a total of 5.71 persons, or 2.27 persons per order.

TABLE No. 2.—*Oakland.* Of the 5,342 applications for help, 4,980, or 93.2 per cent, were from employers in Oakland, and 362, or 6.8 per cent, were from outside Oakland. The greatest demand was made in August, when 943 applications were made to the office. A total of 2,207 individual employers made use of the office, 379 of whom gave their first order in the banner month of September. Each employer averaged 2.42 orders, and applied for a total of 3.36 persons, or 1.39 persons per order.

TABLE No. 3.—*Sacramento.* Of the 2,862 applications for help, 1,510, or 52.8 per cent, were from employers in Sacramento, and 1,352, or 47.2 per cent, were from outside Sacramento. The greatest demand was made in September, when 655 applications were made to the office. A total of 1,072 individual employers made use of the office, 168 of whom gave their first order in the banner month of September. Each employer averaged 2.67 orders, and applied for a total of 7.86 persons, or 2.94 persons per order.

TABLE No. 4.—*Los Angeles.* The 3,093 applications for help were all received from employers outside of Los Angeles City, being the state's pro rata of the joint office business. The greatest demand was made in September, when 485 applications were made to the office. A total of 1,212 individual employers made use of the office, of whom 191 gave their first order in the banner month of May. Each employer averaged 2.55 orders, and applied for a total of 10.37 persons, or 4.06 persons per order.

TABLE No. 5.—*All Offices.* Of the 20,649 applications for help, 13,537, or 65.6 per cent, were from employers in cities where offices are maintained, and 7,112, or 34.4 per cent, from employers outside these cities. The greatest demand was made on the bureaus in September, when 3,498 applications came in. A total of 8,206 individual employers made use of the bureaus, of whom 1,273 gave their first order in the banner month of June. Each employer averaged 2.52 orders, and applied for a total of 6.05 persons, or 2.40 persons per order.

The 20,649 applications were furnished by the different offices in the following amounts and proportions: San Francisco, 9,352, or 45.3 per cent; Oakland, 5,342, or 25.9 per cent; Sacramento, 2,862, or 13.8 per cent; and Los Angeles, 3,093, or 15.0 per cent.

The 8,206 employers comprise 3,715, or 45.3 per cent, from San Francisco; 2,207, or 26.9 per cent, from Oakland; 1,072, or 13.0 per cent, from Sacramento; and 1,212, or 14.8 per cent, from Los Angeles.

Number of Persons Applied for From February 1, 1916, to October 31, 1916.

TABLES No. 6 to No. 10, inclusive.

TABLE No. 6.—*San Francisco.* Of the 21,217 persons applied for, 17,813, or 84.0 per cent, were males, and 3,404, or 16.0 per cent, were females; 12,068, or 56.9 per cent, were wanted in town, and 9,149, or 43.1 per cent, out of town. Of the 12,068 wanted in town, 9,166, or 76.0 per cent, were males and 2,902, or 24.0 per cent, were females. Of the 9,149 wanted out of town, 8,647, or 94.5 per cent, were males and 502, or 5.5 per cent, were females.

TABLE No. 7.—*Oakland.* Of the 7,413 persons applied for, 5,130, or 69.2 per cent, were males and 2,283, or 30.8 per cent, were females; 6,763, or 91.2 per cent, were wanted in town and 650, or 8.8 per cent, out of town. Of the 6,763 wanted in town, 4,611, or 68.2 per cent, were males and 2,152, or 31.8 per cent, were females. Of the 650 wanted out of town, 519, or 79.8 per cent, were males and 131, or 20.2 per cent, were females.

TABLE No. 8.—*Sacramento.* Of the 8,426 persons applied for, 7,621, or 90.4 per cent, were males and 805, or 9.6 per cent, were females; 3,035, or 36.0 per cent, were wanted in town and 5,391, or 64.0 per cent, out of town. Of the 3,035 wanted in town, 2,483, or 81.8 per cent, were males and 552, or 18.2 per cent, were females. Of the 5,391 wanted out of town, 5,138, or 95.3 per cent, were males and 253, or 4.7 per cent, were females.

TABLE No. 9.—*Los Angeles.* Of the 12,569 persons applied for, 11,108, or 88.4 per cent, were males and 1,461, or 11.6 per cent, were females. The entire 12,569 were wanted out of town.

Table No. 10.—*All Offices.* Of the 49,625 persons applied for, 41,672, or 84.0 per cent, were males and 7,953, or 16.0 per cent, were females; 21,866, or 44.1 per cent, were wanted in the cities where offices are maintained and 27,759, or 55.9 per cent, outside the towns. Of the 21,866 wanted in town, 16,260, or 74.4 per cent, were males and 5,606, or 25.6 per cent, were females. Of the 27,759 wanted out of town, 25,412, or 91.6 per cent, were males and 2,347, or 8.4 per cent, were females.

Demand was made on the San Francisco office for 21,217, or 42.8 per cent, of the 49,625 wanted; on Oakland for 7,413, or 14.9 per cent; on Sacramento for 8,426, or 17.0 per cent; and on Los Angeles for 12,569, or 25.3 per cent.

Number of Persons Referred to Positions From February 1, 1916, to October 31, 1916.

Tables No. 11 to No. 15, inclusive.

Table No. 11.—*San Francisco.* Of the 19,079 persons referred to positions, 15,548, or 81.5 per cent, were males and 3,531, or 18.5 per cent, were females; 12,163, or 63.8 per cent, were referred to positions in town and 6,916, or 36.2 per cent, to positions out of town. Of the 12,163 referred in town, 8,873, or 73.0 per cent, were males and 3,290, or 27.0 per cent, were females. Of the 6,916 referred to out-of-town positions, 6,675, or 96.5 per cent, were males and 241, or 3.5 per cent, were females.

Table No. 12.—*Oakland.* Of the 7,402 person referred to positions, 5,107, or 69.0 per cent, were males and 2,295, or 31.0 per cent, were females; 6,979, or 94.3 per cent, were referred to positions in town and 423, or 5.7 per cent, to positions out of town. Of the 6,979 referred in town, 4,752, or 68.1 per cent, were males and 2,227, or 31.9 per cent, were females. Of the 423 referred to out-of-town positions, 355, or 83.9 per cent, were males, and 68, or 16.1 per cent, were females.

Table No. 13.—*Sacramento.* Of the 7,011 persons referred to positions, 6,276, or 89.5 per cent, were males and 735, or 10.5 per cent, were females; 2,718, or 38.8 per cent, were referred to positions in town and 4,293, or 61.2 per cent, to positions out of town. Of the 2,718 referred in town, 2,187, or 80.5 per cent, were males and 531, or 19.5 per cent, were females. Of the 4,293 referred to out-of-town positions, 4,089, or 95.2 per cent, were males and 204, or 4.8 per cent, were females.

Table No. 14.—*Los Angeles.* Of the 11,967 persons referred to positions, 10,815, or 90.4 per cent, were males and 1,152, or 9.6 per cent, were females. The entire 11,967 were referred for out-of-town positions.

TABLE No. 15.—*All Offices.* Of the 45,459 persons referred to positions, 37,746, or 83.0 per cent, were males and 7,713, or 17.0 per cent, were females; 21,860, or 48.1 per cent, were referred to positions in the towns where offices are maintained and 23,599, or 51.9 per cent, to positions outside of these towns. Of the 21,860 referred in town, 15,812, or 72.3 per cent, were males and 6,048, or 27.7 per cent, were females. Of the 23,599 referred to out-of-town positions, 21,934, or 92.9 per cent, were males and 1,665, or 7.1 per cent, were females.

The total of 45,459 referred by all offices was made up by 19,079, or 42.0 per cent, from San Francisco; 7,402, or 16.3 per cent, from Oakland; 7,011, or 15.4 per cent, from Sacramento, and 11,967, or 26.3 per cent, from Los Angeles.

Positions Reported Filled From February 1, 1916, to October 31, 1916.

TABLES No. 16 to No. 20, inclusive.

TABLE No. 16.—*San Francisco.* Of the 15,101 positions reported filled by the San Francisco office, 12,838, or 85.0 per cent, were for males and 2,263, or 15.0 per cent, were for females; 9,031, or 59.8 per cent, were placements in San Francisco and 6,070, or 40.2 per cent, were out of town. Of the 9,031 positions in town, 6,940, or 76.8 per cent, were for males and 2,091, or 23.2 per cent, were for females. Of the 6,070 out-of-town positions, 5,898, or 97.2 per cent, were filled by males and 172, or 2.8 per cent, were filled by females.

TABLE No. 17.—*Oakland.* Of the 5,427 positions reported filled by the Oakland office, 4,047, or 74.6 per cent, were for males and 1,380, or 25.4 per cent, were for females; 5,029, or 92.7 per cent, were placements in Oakland and 398, or 7.3 per cent, were out of town. Of the 5,029 positions in town, 3,709, or 73.8 per cent, were for males and 1,320, or 26.2 per cent, were for females. Of the 398 out-of-town positions, 338, or 84.9 per cent, were filled by males and 60, or 15.1 per cent, were filled by females.

TABLE No. 18.—*Sacramento.* Of the 6,435 positions filled by the Sacramento office, 6,019, or 93.5 per cent, were for males and 416, or 6.5 per cent, were for females; 2,287, or 35.5 per cent, were placements in Sacramento and 4,148, or 64.5 per cent, were out of town. Of the 2,287 positions in town, 2,026, or 88.6 per cent, were for males and 261, or 11.4 per cent, were for females. Of the 4,148 out-of-town positions, 3,993, or 96.3 per cent, were filled by males and 155, or 3.7 per cent, by females.

TABLE No. 19.—*Los Angeles.* Of the 11,587 positions filled by the Los Angeles office, 10,550, or 91.1 per cent, were for males and 1,037, or 8.9 per cent, for females. Necessarily all of the 11,587 positions filled were outside the city limits of Los Angeles.

TABLE NO. 20.—*All Offices.* Of the 38,550 positions reported filled by the four offices, 33,454, or 86.8 per cent, were for males and 5,096, or 13.2 per cent, for females; 16,347, or 42.4 per cent, were placements in the cities where the offices are maintained and 22,203, or 57.6 per cent, were placed outside these cities. Of the 16,347 positions in town, 12,675, or 77.5 per cent, were for males and 3,672, or 22.5 per cent, were for females. Of the out-of-town positions, 20,779, or 93.6 per cent, were filled by males and 1,424, or 6.4 per cent, by females.

Excluding Los Angeles, the three offices maintained entirely by the state filled 26,963 positions, of which 22,904, or 84.9 per cent, were for males and 4,059, or 15.1 per cent, were for females. Considered from this standpoint, the 16,347 placements in town become 60.6 per cent of the total, and the out-of-town placements are 10,616, or 39.4 per cent. (This variation is due to the fact that all positions credited to the state bureaus from Los Angeles are the out-of-town positions of that office, the positions filled within the city being credited to the municipal bureau.) Of the 10,616 out-of-town positions, 10,229, or 96.4 per cent, were filled by males and 387, or 3.6 per cent, by females. Of course there would be no change in the in-town positions as given above.

Number of Renewals, and Individuals Placed, From February 1, 1916, to October 31, 1916.

TABLES NO. 21 to NO. 24, inclusive.

TABLE NO. 21.—*San Francisco.* Of the 12,838 positions furnished to males, 3,821, or 29.8 per cent, were renewals, leaving 9,017 individuals served. During October the renewals amounted to 48.5 per cent, leaving 948, or 51.5 per cent, of the male positions as being given to individuals not previously placed by the office. Of the 2,263 positions furnished females, 478, or 21.1 per cent, were renewals, leaving 1,785 individuals served. During October the renewals amounted to 43.9 per cent, leaving 189, or 56.1 per cent of the female positions as being given to individuals not previously placed by the office.

Of the total 15,101 positions furnished, 4,299, or 28.5 per cent, were renewals, leaving 10,802 individuals served. During October, however, the renewals had crept up to 1,041, or 47.8 per cent of the total 2,178 placements, leaving 1,137, or 52.2 per cent, as being given to individuals not previously placed by the office.

TABLE NO. 22.—*Oakland.* Of the 4,047 positions furnished males, 1,789, or 44.2 per cent, were renewals, leaving 2,258 individuals served. During October the renewals amounted to 53.1 per cent, leaving 249, or 46.9 per cent, of the male positions as being given to individuals not previously placed by the office. Of the 1,380 positions furnished to females, 488, or 35.4 per cent, were renewals, leaving 892 individuals served. During October the renewals amounted to 51.1 per cent, leaving 89, or 48.9 per cent of the female positions as being given to individuals not previously placed by the office.

Of the 5,427 total positions furnished, 2,277, or 42.0 per cent, were renewals, leaving 3,150 individuals served. During October, however, the renewals had crept up to 375, or 52.6 per cent of the total 713 placements, leaving 338, or 47.4 per cent as being given to individuals not previously placed by this office.

TABLE NO. 23.—*Sacramento.* Of the 6,019 positions furnished males, 1,622, or 26.9 per cent, were renewals, leaving 4,397 individuals served. During October the renewals amounted to 34.9 per cent, leaving 641, or 65.1 per cent of the male positions as being given to individuals not previously placed by the office. Of the 416 positions furnished females, 98, or 23.6 per cent, were renewals, leaving 318 individuals served. During October the renewals amounted to 36.2 per cent, leaving 30, or 63.8 per cent of the female positions as being given to individuals not previously placed by the office.

Of the 6,435 total positions furnished, 1,720, or 26.7 per cent, were renewals, leaving 4,715 individuals served. During October the renewals had increased to 361, or 35.0 per cent of the total 1,032 placements, leaving 671, or 65.0 per cent as being given to individuals not previously placed by this office.

TABLE NO. 24.—*San Francisco, Oakland and Sacramento.* Of the 22,904 positions furnished males in the three offices maintained entirely by the state, 7,232, or 31.6 per cent, were renewals, leaving 15,672 individuals served. During October the renewals amounted to 45.2 per cent, leaving 1,838, or 54.8 per cent of the male positions as being given to individuals not previously placed by these offices.

Of the 4,059 positions furnished females in the same three offices, 1,064, or 26.2 per cent, were renewals, leaving 2,995 individuals served. During October the renewals amounted to 45.6 per cent, leaving 308, or 54.4 per cent of the female positions as being given to individuals not previously placed by these offices.

Of the 26,963 total positions furnished by San Francisco, Oakland and Sacramento, 8,296, or 30.8 per cent, were renewals, leaving 18,667 individuals served. During October the renewals had increased to 1,777, or 45.3 per cent of the total 3,923 placements, leaving 2,146, or 54.7 per cent as being given to individuals not previously placed by these offices.

Percentages of Individuals Placed to Individuals Registered by Sex From February 1, 1916, to October 31, 1916.

San Francisco, Oakland and Sacramento.

TABLE No. 25.

The percentages of males placed to males registered range from 52.5 per cent in San Francisco to 73.6 per cent in Sacramento; of females, from 29.7 in Sacramento to 40.6 per cent in Oakland; and the percentages of both males and females placed to registered range from 47.3 per cent in San Francisco to 66.9 per cent in Sacramento.

Registration of Applicants for Employment From February 1, 1916, to October 31, 1916.

TABLES No. 26 to No. 29, inclusive.

TABLE NO. 26.—*San Francisco.* Of the 22,831 applicants registered, 17,163, or 75.2 per cent, were males and 5,668, or 24.8 per cent, were females; 21,835, or 95.6 per cent, were residents of San Francisco and 996, or 4.4 per cent, were from out of town. Of the 21,835 applicants in town, 16,517, or 75.6 per cent, were males and 5,318, or 24.4 per cent, were females. Of the 996 out-of-town applicants, 646, or 64.9 per cent, were males and 350, or 35.1 per cent, were females.

TABLE NO. 27.—*Oakland.* Of the 6,294 applicants registering at the Oakland office, 4,096, or 65.1 per cent, were males and 2,198, or 34.9 per cent, were females; 6,200, or 98.5 per cent, were residents of Oakland and 94, or 1.5 per cent, were from out of town. Of the 6,200 applicants in town, 4,024, or 64.9 per cent, were males and 2,176, or 35.1 per cent, were females. Of the 94 out-of-town applicants, 72, or 76.6 per cent, were males and 22, or 23.4 per cent, were females.

TABLE NO. 28.—*Sacramento.* Of the 7,043 applicants registered at the Sacramento office, 5,974, or 84.8 per cent, were males and 1,069, or 15.2 per cent were females; 6,983, or 99.1 per cent, were residents of Sacramento and 60, or 0.9 per cent, were from out of town. Of the 6,983 applicants in town, 5,950, or 85.2 per cent, were males and 1,033, or 14.8 per cent, were females. Of the 60 out-of-town applicants, 24, or 40.0 per cent, were males and 36, or 60.0 per cent, were females.

TABLE NO. 29.—*San Francisco, Oakland and Sacramento.* The total of 36,168 applicants were divided as follows among the three registration offices: San Francisco, 22,831, or 63.1 per cent; Oakland, 6,294, or 17.4 per cent, and Sacramento, 7,043, or 19.5 per cent. The males comprised 27,233, or 75.3 per cent, and the females 8,935, or 24.7 per cent. Residents of these three towns furnished 35,018, or 96.8 per cent of the total, and 1,150, or 3.2 per cent, were from outside the towns. Of the 35,018 in-town registrations, 26,491, or 75.7 per cent, were males and 8,527, or 24.3 per cent, were females. Of the 1,150 out-of-town registrations, 742, or 64.5 per cent, were males and 408, or 35.5 per cent, were females. No registration figures are given for Los Angeles, as applicants sent out of town are taken from their regular register, which of course can not provide for separate registration for in-town and out-of-town work.

Nativity and Citizenship of Applicants Registered From February 1, 1916, to June 30, 1916.

Table No. 30.

San Francisco. Of the 12,630 considered, 7,781, or 61.6 per cent, were native born and 4,849, or 38.4 per cent, were foreign born; 10,120, or 80.1 per cent, were citizens and 2,510, or 19.9 per cent, were aliens.

Oakland. Of the 4,080 considered, 2,922, or 71.6 per cent, were native born and 1,158, or 28.4 per cent, were foreign born; 3,535, or 86.6 per cent, were citizens and 545, or 13.4 per cent, were aliens.

Sacramento. Of the 3,067 considered, 2,130, or 69.4 per cent, were native born and 937, or 30.6 per cent, were foreign born; 2,566, or 83.7 per cent, were citizens and 501, or 16.3 per cent, were aliens.

San Francisco, Oakland and Sacramento. Of the 19,777 considered, 12,833, or 64.9 per cent, were native born and 6,944, or 35.1 per cent, were foreign born; 16,221, or 82.0 per cent, were citizens and 3,556, or 18.0 per cent, were aliens. Of the 16,221 citizens, 11,477, or 70.8 per cent, were males and 4,744, or 29.2 per cent, were females. Of the 3,556 aliens, 2,814, or 79.1 per cent, were males and 742, or 20.9 per cent, were females.

Marital Condition of Applicants Registered From February 1, 1916, to June 30, 1916.

Table No. 31.

San Francisco. Of the 12,630 registered, 7,846, or 62.1 per cent, were single, 3,576, or 28.3 per cent, were married and 1,208, or 9.6 per cent, were widowed. Of the 7,846 single, 6,091, or 77.6 per cent, were males and 1,755, or 22.4 per cent, were females. Of the 3,576 married, 2,651, or 74.1 per cent, were males and 925, or 25.9 per cent, were females. Of the 1,208 widowed, 435, or 36.0 per cent, were males and 773, or 64.0 per cent, were females.

Oakland. Of the 4,080 registered, 1,901, or 46.6 per cent, were single, 1,475, or 36.2 per cent, were married and 704, or 17.2 per cent, were widowed. Of the 1,901 single, 1,337, or 70.3 per cent, were males and 564, or 29.7 per cent, were females. Of the 1,475 married, 1,142, or 77.4 per cent, were males and 333, or 22.6 per cent, were females. Of the 704 widowed, 167, or 23.7 per cent, were males and 537, or 76.3 per cent, were females.

Sacramento. Of the 3,067 registered, 1,895, or 61.8 per cent, were single, 826, or 26.9 per cent, were married and 346, or 11.3 per cent, were widowed. Of the single, 1,743, or 92.0 per cent, were males and 152, or 8.0 per cent, were females. Of the 826 married, 606, or 73.4 per cent, were males and 220, or 26.6 per cent, were females. Of the 346 widowed, 119, or 34.4 per cent, were males and 227, or 65.6 per cent, were females.

San Francisco, Oakland and Sacramento. Of the 19,777 registered, 11,642, or 58.9 per cent, were single, 5,877, or 29.7 per cent were married and 2,258, or 11.4 per cent, were widowed. Of the 11,642 single, 9,171, or 78.8 per cent, were males and 2,471, or 21.2 per cent, were females. Of the 5,877 married, 4,399, or 74.9 per cent, were males and 1,478, or 25.1 per cent, were females. Of the 2,258 widowed, 721, or 31.9 per cent, were males and 1,537, or 68.1 per cent, were females.

Duration of Residence of Applicants Registered From February 1, 1916, to June 30, 1916.

TABLES No. 32 to No. 35, inclusive.

TABLE No. 32.—*San Francisco.* Of the 9,177 males registered to June 30, 1916, 2,198, or 24.0 per cent, resided in San Francisco less than a year and 6,979, or 76.0 per cent, one year or more; 1,206, or 13.1 per cent, resided in California less than a year and 7,971, or 86.9 per cent, one year or more; 399, or 4.3 per cent, resided in the United States less than a year and 8,778, or 95.7 per cent, one year or more.

Of the 3,453 females registered, 620, or 18.0 per cent, resided in San Francisco less than a year and 2,833, or 82.0 per cent, one year or more; 427, or 12.4 per cent, resided in California less than a year and 3,026, or 87.6 per cent, one year or more; 228, or 6.6 per cent, resided in the United States less than a year and 3,225, or 93.4 per cent, one year or more.

Of the total registration of 12,630 up to this period, 2,818, or 22.3 per cent, resided in San Francisco less than a year and 9,812, or 77.7 per cent, one year or more; 1,633, or 12.9 per cent, resided in California less than a year and 10,997, or 87.1 per cent, a year or more; 627, or 5.0 per cent, resided in the United States less than a year and 12,003 or 95.0 per cent, a year or more.

TABLE No. 33.—*Oakland.* Of the 2,646 males registered to June 30, 1916, 690, or 26.1 per cent, resided in Oakland less than a year and 1,956, or 73.9 per cent, one year or more; 252, or 9.5 per cent, resided in California less than a year and 2,394, or 90.5 per cent, a year or more; 77, or 2.9 per cent, resided in the United States less than a year and 2,569, or 97.1 per cent, a year or more.

Of the 1,434 females registered, 352, or 24.5 per cent, resided in Oakland less than a year and 1,082, or 75.5 per cent, a year or more; 108, or 7.5 per cent, resided in California less than a year and 1,326, or 92.5 per cent, a year or more; 39, or 2.7 per cent, resided in the United States less than a year and 1,395, or 97.3 per cent, a year or more.

Of the total registration of 4,080 up to this period, 1,042, or 25.5 per cent, resided in Oakland less than a year and 3,038, or 74.5 per cent, a year or more; 360, or 8.8 per cent, resided in California less than a year and 3,720, or 91.2 per cent, a year or more; 116, or 2.8 per cent, resided in the United States less than a year and 3,964, or 97.2 per cent, a year or more.

TABLE NO. 34.—*Sacramento.* Of the 2,468 males registered to June 30, 1916, 1,097, or 44.4 per cent, resided in Sacramento less than a year and 1,371, or 55.6 per cent, a year or more; 240, or 9.7 per cent, resided in California less than a year and 2,228, or 90.3 per cent, a year or more; 29, or 1.2 per cent, resided in the United States less than a year and 2,439, or 98.2 per cent, a year or more.

Of the 599 females registered, 256, or 42.7 per cent, resided in Sacramento less than a year and 343, or 57.3 per cent, a year or more; 66, or 11.0 per cent, resided in California less than a year and 533, or 89.0 per cent, a year or more; 26, or 4.3 per cent, resided in the United States less than a year and 573, or 95.7 per cent, a year or more.

Of the total registration of 3,067 up to this period, 1,353, or 44.1 per cent, resided in Sacramento less than a year and 1,714, or 55.9 per cent, a year or more; 306, or 10.0 per cent, resided in California less than a year and 2,761, or 90.0 per cent, a year or more; 55, or 1.8 per cent, resided in the United States less than a year and 3,012, or 98.2 per cent, a year or more.

TABLE NO. 35.—*San Francisco, Oakland and Sacramento.* Of the 14,291 males registered up to June 30, 1916, 3,985, or 27.9 per cent, resided in their respective registration cities less than a year and 10,306, or 72.1 per cent, a year or more; 1,698, or 11.9 per cent, resided in California less than a year and 12,593, or 88.1 per cent, a year or more; 505, or 3.5 per cent, resided in the United States less than a year and 13,786, or 96.5 per cent a year or more.

Of the 5,486 females registered, 1,228, or 22.4 per cent, resided in their respective registration cities less than a year and 4,258, or 77.6 per cent, a year or more; 601, or 11.0 per cent, resided in California less than a year and 4,885, or 89.0 per cent, a year or more; 293, or 5.3 per cent, resided in the United States less than a year and 5,193, or 94.7 per cent, a year or more.

Of the total registration of 19,777 up to this period, 5,213, or 26.4 per cent, resided in their respective registration cities less than a year and 14,564, or 73.6 per cent, a year or more; 2,299, or 11.6 per cent, resided in California less than a year and 17,478, or 88.4 per cent, a year or more; 798, or 4.0 per cent, resided in the United States less than a year and 18,979, or 96.0 per cent, a year or more.

INDUSTRIES AND OCCUPATIONS.

Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916.

TABLES No. 36 to No. 40, inclusive.

The tables show in detail just what demand was made on the different offices in each occupation of the industries listed, and also just how many applicants were referred and placed.

In some instances the registrations do not equal the number reported placed, because many applicants register under one occupation and will readily accept work at anything turning up. No registration figures are available for the Los Angeles office.

These figures are further condensed into totals for industries only (see tables 41 to 45, inclusive).

Number Wanted and Number Placed, by Industries, From February 1, 1916, to June 30, 1916.

TABLES No. 41 to No. 45, inclusive.

TABLE No. 41.—*San Francisco.* Of the 5,341 males placed, 1,431, or 26.8 per cent, were taken by transportation and public utilities; followed by hotels and restaurants with 687, or 12.9 per cent; agriculture with 326, or 6.1 per cent; and building and construction with 304, or 5.7 per cent. The miscellaneous group (all others) comprised 2,192, or 41.0 per cent, of the total.

Of the 1,112 females placed, 449, or 40.4 per cent, were taken into private homes; 284, or 25.5 per cent, by hotels and restaurants; and 281, or 25.3 per cent, by factories.

Of the 6,453 placements of both sexes, 1,431, or 22.2 per cent, were in transportation and public utilities; 971, or 15.0 per cent, in hotels and restaurants; 449, or 7.0 per cent, in private homes; 326, or 5.1 per cent, in agriculture; 304, or 4.7 per cent, in building and construction; 281, or 4.4 per cent, in factories; and 88, or 1.4 per cent, in clerical and professional work. The miscellaneous group (all others) accounted for 2,222, or 34.4 per cent of the total.

TABLE No. 42.—*Oakland.* Of the 1,699 males placed, 329, or 19.4 per cent, were taken by building and construction; followed by hotels and restaurants with 267, or 15.7 per cent; transportation and public utilities with 182, or 10.7 per cent; agriculture by 130, or 7.7 per cent; and wholesale and retail with 93, or 5.5 per cent. The miscellaneous group (all others) comprised 502, or 29.5 per cent of the total.

Of the 674 females placed, 469, or 70.0 per cent, were taken into private homes; 124, or 18.4 per cent, by hotels and restaurants; and 30, or 4.4 per cent, in office work.

Of the 2,373 placements of both sexes, 469, or 19.8 per cent, were in private homes; 391, or 16.5 per cent, in hotels and restaurants; 329, or 13.9 per cent, in building and construction; 182, or 7.7 per cent, in transportation and public utilities; and 35, or 1.5 per cent, in clerical and professional. The miscellaneous group (all others) accounted for 510, or 21.5 per cent of the total.

TABLE NO. 43.—*Sacramento.* Of the 1,536 males placed, 615, or 40.0 per cent, were taken by transportation and public utilities; followed by building and construction with 330, or 21.5 per cent; agriculture with 322, or 21.0 per cent; and hotels and restaurants with 104, or 6.8 per cent of the total.

Of the 182 females placed, 116, or 63.7 per cent, were taken in private homes; and 53, or 29.1 per cent, by hotels and restaurants.

Of the 1,718 placements of both sexes, 615, or 35.8 per cent, were with transportation and public utility companies; 330, or 19.2 per cent, in the building and construction line; 322, or 18.7 per cent, in agriculture; 157, or 9.1 per cent, in hotels and restaurants; 116, or 6.8 per cent, in private homes; and 3, or 0.2 per cent, in clerical and professional work.

TABLE NO. 44.—*Los Angeles.* Of the 5,159 males placed, 2,031, or 39.5 per cent, were taken by transportation and public utilities; followed by motion pictures with 1,128, or 21.9 per cent; building and construction with 795, or 15.4 per cent; agriculture with 489, or 9.5 per cent; and hotels and restaurants with 297, or 5.8 per cent of the total.

Of the 390 females placed, 216, or 55.4 per cent, were with motion pictures; 72, or 18.5 per cent, in agriculture; 65, or 16.7 per cent, in private homes; and 35, or 9.0 per cent, with hotels and restaurants.

Of the 5,549 placements of both sexes, 2,031, or 36.6 per cent, were with transportation and public utilities; 1,344, or 24.2 per cent, with motion pictures; 795, or 14.3 per cent, with building and construction; 561, or 10.1 per cent, in agriculture; and 332, or 6.0 per cent, with hotels and restaurants.

TABLE NO. 45.—*All Offices.* Of the 13,735 males placed, 4,259, or 31.0 per cent, were taken by transportation and public utilities; followed by building and construction with 1,758, or 12.8 per cent; hotels and restaurants with 1,355, or 9.9 per cent; agriculture with 1,267, or 9.2

per cent, and motion pictures with 1,128, or 8.2 per cent. The miscellaneous group (all others) comprised 2,890, or 21.1 per cent of the total.

Of the 2,358 females placed, 1,099, or 46.6 per cent, were in private homes; 496, or 21.0 per cent, with hotels and restaurants; 305, or 12.9 per cent, in factories; and 216, or 9.2 per cent, in motion pictures.

Of the 16,093 placements of both sexes, 4,259, or 26.5 per cent, were with transportation and public utility companies; 1,851, or 11.5 per cent, with hotels and restaurants; 1,758, or 10.9 per cent, in building and construction; 1,347, or 8.4 per cent, in agriculture; 1,344, or 8.4 per cent, in motion pictures; 1,099, or 6.8 per cent, in private homes; and 129, or 0.8 per cent, in clerical and professional work. The miscellaneous group (all others) comprised 2,935, or 18.2 per cent of the total.

STATISTICAL TABLES.

TABLE No. 1. Number of Applications for Help From Employers and Number of Employers Patronizing Office.

San Francisco.

Month	Applications for help			New employers patronizing office each month
	In town	Out of town	Total	
February, 1916	134	27	161	131
March	364	134	498	292
April	599	161	760	401
May	910	235	1,145	395
June	798	347	1,145	776
Totals to June 30, 1916	2,805	904	3,709	1,995
July	942	353	1,295	549
August	1,197	374	1,571	253
September	1,161	352	1,513	413
October	942	322	1,264	505
Totals	7,047	2,305	9,352	3,715

TABLE No. 2. Number of Applications for Help From Employers and Number of Employers Patronizing Office.

Oakland.

Month	Applications for help			New employers patronizing office each month
	In town	Out of town	Total	
February, 1916	110	6	116	89
March	346	39	385	252
April	466	58	524	261
May	543	41	584	253
June	510	28	538	228
Totals to June 30, 1916	1,975	172	2,147	1,083
July	671	58	729	279
August	894	49	943	325
September	804	41	845	379
October	636	42	678	141
Totals	4,980	362	5,342	2,207

TABLE No. 3. Number of Applications for Help From Employers and Number of Employers Patronizing Office.

Sacramento.

Month	Applications for help			New employers patronizing office each month
	In town	Out of town	Total	
February, 1916	24	16	40	37
March	65	66	131	117
April	118	96	214	78
May	182	130	312	144
June	163	120	283	101
Totals to June 30, 1916	552	428	980	477
July	182	158	340	123
August	243	216	459	165
September	335	320	655	168
October	198	230	428	139
Totals	1,510	1,352	2,862	1,072

TABLE No. 4. Number of Applications for Help From Employers and Number of Employers Patronizing Office.
Los Angeles.

Month	Applications for help			New employers patronizing office each month
	In town	Out of town	Total	
February, 1916		253	253	35
March		137	137	13
April		293	293	143
May		393	393	191
June		403	403	168
Totals to June 30, 1916		1,479	1,479	550
July		346	346	149
August		396	396	168
September		485	485	189
October		387	387	156
Totals		3,093	3,093	1,212

NOTE.—Under arrangement with Los Angeles state is credited only with out of town positions.

TABLE No. 5. Number of Applications for Help From Employers and Number of Employers Patronizing Offices.
All Offices.

Month	Applications for help			New employers patronizing office each month
	In town	Out of town	Total	
February, 1916	268	302	570	292
March	775	376	1,151	674
April	1,183	608	1,791	883
May	1,635	799	2,434	983
June	1,471	898	2.369	1,273
Totals to June 30, 1916	5,332	2,983	8,315	4,105
July	1,795	915	2,710	1,100
August	2,334	1,035	3,369	911
September	2,300	1,198	3,498	1,149
October	1,776	981	2,757	941
Totals	13,537	7,112	20,649	8,206

TABLE No. 6. Number of Persons Applied For.
San Francisco.

Month	Male	Female	In town	Out of town	Total
February, 1916	186	38	173	51	224
March	943	161	489	615	1,104
April	1,690	281	1,112	859	1,971
May	2,097	412	1,486	1,023	2,509
June	1,953	450	1,339	1,064	2,403
Totals to June 30, 1916	6,869	1,342	4,599	3,612	8,211
July	2,022	417	1,383	1,056	2,439
August	3,169	549	2,122	1,596	3,718
September	3,229	506	2,092	1,643	3,735
October	2,524	590	1,872	1,242	3,114
Totals	17,813	3,404	12,068	9,149	21,217

TABLE No. 7. Number of Persons Applied For.
Oakland.

Month	Male	Female	In town	Out of town	Total
February, 1916	78	54	124	8	132
March	414	176	481	109	590
April	491	201	590	102	692
May	531	264	720	75	795
June	447	216	625	38	663
Totals to June 30, 1916	1,961	911	2,540	332	2,872
July	685	309	919	75	994
August	906	391	1,238	59	1,297
September	924	361	1,160	125	1,285
October	654	311	906	59	965
Totals	5,130	2,283	6,763	650	7,413

TABLE No. 8. Number of Persons Applied For.
Sacramento.

Month	Male	Female	In town	Out of town	Total
February, 1916	39	14	34	19	53
March	185	49	100	134	234
April	415	66	285	196	481
May	546	115	413	248	661
June	646	81	432	295	727
Totals to June 30, 1916	1,831	325	1,264	892	2,156
July	874	85	350	609	959
August	2,232	186	605	1,813	2,418
September	1,468	115	544	1,039	1,583
October	1,216	94	272	1,038	1,310
Totals	7,621	805	3,035	5,391	8,426

TABLE No. 9. Number of Persons Applied For.
Los Angeles.

Month	Male	Female	In town	Out of town	Total
February, 1916	1,261	----------	----------	1,261	1,261
March	589	37	----------	626	626
April	787	70	----------	857	857
May	1,321	168	----------	1,489	1,489
June	1,445	238	----------	1,683	1,683
Totals to June 30, 1916	5,403	513	----------	5,916	5,916
July	1,431	309	----------	1,740	1,740
August	1,272	274	----------	1,546	1,546
September	1,807	226	----------	2,033	2,033
October	1,195	139	----------	1,334	1,334
Totals	11,108	1,461	----------	12,569	12,569

TABLE No. 10. Number of Persons Applied For. All Offices.

Month	Male	Female	In town	Out of town	Total
February, 1916	1,564	106	331	1,339	1,670
March	2,131	423	1,070	1,484	2,554
April	3,383	618	1,987	2,014	4,001
May	4,495	959	2,619	2,835	5,454
June	4,491	985	2,396	3,080	5,476
Totals to June 30, 1916	16,064	3,091	8,403	10,752	19,155
July	5,012	1,120	2,652	3,480	6,132
August	7,579	1,400	3,965	5,014	8,979
September	7,428	1,208	3,796	4,840	8,636
October	5,589	1,134	3,050	3,673	6,723
Totals	41,672	7,953	21,866	27,759	49,625

TABLE No. 11. Number of Persons Referred to Positions. San Francisco.

Month	Male	Female	In town	Out of town	Total
February, 1916	185	40	175	50	225
March	864	206	511	559	1,070
April	1,362	373	1,087	648	1,735
May	1,738	421	1,437	722	2,159
June	1,957	581	1,421	1,117	2,538
Totals to June 30, 1916	6,106	1,621	4,631	3,096	7,727
July	1,970	446	1,566	850	2,416
August	2,349	500	1,858	991	2,849
September	2,807	400	2,091	1.116	3,207
October	2,316	564	2,017	863	2,880
Totals	15,548	3,531	12,163	6,916	19,079

TABLE No. 12. Number of Persons Referred to Positions. Oakland.

Month	Male	Female	In town	Out of town	Total
February, 1916	68	48	109	7	116
March	435	222	572	85	657
April	541	247	597	91	788
May	535	314	817	32	849
June	448	242	660	30	690
Totals to June 30, 1916	2,027	1.073	2,855	245	3,100
July	666	292	912	46	958
August	927	293	1,177	43	1,220
September	823	298	1,072	49	1,121
October	664	339	963	40	1,003
Totals	5,107	2,295	6,979	423	7,402

TABLE No. 13. Number of Persons Referred to Positions.

Sacramento.

Month	Male	Female	In town	Out of town	Total
February, 1916	38	14	34	18	52
March	162	30	97	95	192
April	382	49	257	174	431
May	469	108	346	231	577
June	607	78	399	286	685
Totals to June 30, 1916	1,658	279	1,133	804	1,937
July	760	71	328	503	831
August	1,558	131	483	1,206	1,689
September	1,292	158	512	938	1,450
October	1,008	96	262	842	1,104
Totals	6,276	735	2,718	4,293	7,011

TABLE No. 14. Number of Persons Referred to Positions.

Los Angeles.

Month	Male	Female	In town	Out of town	Total
February, 1916	1,255	----------	----------	1,255	1,255
March	577	27	----------	604	604
April	779	55	----------	834	834
May	1,274	119	----------	1,393	1,393
June	1,403	211	----------	1,614	1,614
Totals to June 30, 1916	5,288	412	----------	5,700	5,700
July	1,432	263	----------	1,695	1,695
August	1,241	230	----------	1,471	1,471
September	1,695	162	----------	1,857	1,857
October	1,159	85	----------	1,244	1,244
Totals	10,815	1,152	----------	11,967	11,967

TABLE No. 15. Number of Persons Referred to Positions.

All Offices.

Month	Male	Female	In town	Out of town	Total
February, 1916	1,546	102	318	1,330	1,648
March	2,038	485	1,180	1,343	2,523
April	3,064	724	2,041	1,747	3,788
May	4,016	962	2,600	2,378	4,978
June	4,415	1,112	2,480	3,047	5,527
Totals to June 30, 1916	15,079	3,385	8,619	9,845	18,464
July	4,828	1,072	2,806	3,094	5,900
August	6,075	1,154	3,518	3,711	7,229
September	6,617	1,018	3,675	3,960	7,635
October	5,147	1,084	3,242	2,989	6,231
Totals	37,746	7,713	21,860	23,599	45,459

TABLE No. 16. Positions Reported Filled.
San Francisco.

Month	Male	Female	In town	Out of town	Total
February, 1916	102	34	120	16	136
March	747	132	363	516	879
April	1,205	308	974	539	1,513
May	1,433	285	1,093	625	1,718
June	1,854	353	1,249	958	2,207
Totals to June 30, 1916	5,341	1,112	3,799	2,654	6,453
July	1,465	260	980	745	1,725
August	1,864	309	1,293	880	2,173
September	2,327	245	1,548	1,024	2,572
October	1,841	337	1,411	767	2,178
Totals	12,838	2,263	9,031	6,070	15,101

TABLE No. 17. Positions Reported Filled.
Oakland.

Month	Male	Female	In town	Out of town	Total
February, 1916	54	39	87	6	93
March	365	136	422	79	501
April	449	141	499	91	590
May	438	187	596	29	625
June	393	171	541	23	564
Totals to June 30, 1916	1,699	674	2,145	228	2,373
July	549	188	697	40	737
August	654	149	775	28	803
September	614	187	743	58	801
October	531	182	669	44	713
Totals	4,047	1,380	5,029	398	5,427

TABLE No. 18. Positions Reported Filled.
Sacramento.

Month	Male	Female	In town	Out of town	Total
February, 1916	29	14	25	18	43
March	93	27	63	57	120
April	345	39	223	161	384
May	466	52	301	217	518
June	603	50	368	285	653
Totals to June 30, 1916	1,536	182	980	738	1,718
July	734	43	306	471	777
August	1,527	59	385	1,201	1,586
September	1,237	85	414	908	1,322
October	985	47	202	830	1,032
Totals	6,019	416	2,287	4,148	6,435

TABLE No. 19. Positions Reported Filled.
Los Angeles.

Month	Male	Female	In town	Out of town	Total
February, 1916	1,253	----------	----------	1,253	1,253
March	564	25	----------	589	589
April	756	43	----------	799	799
May	1,235	116	----------	1,351	1,351
June	1,351	206	----------	1,557	1,557
Totals to June 30, 1916	5,159	390	----------	5,549	5,549
July	1,392	238	----------	1,630	1,630
August	1,199	191	----------	1,390	1,390
September	1,661	146	----------	1,807	1,807
October	1,139	72	----------	1,211	1,211
Totals	10,550	1,037	----------	11,587	11,587

TABLE No. 20. Positions Reported Filled.
All Offices.

Month	Male	Female	In town	Out of town	Total
February, 1916	1,438	87	232	1,293	1,525
March	1,769	320	848	1,241	2,089
April	2,755	531	1,696	1,590	3,286
May	3,572	640	1,990	2,222	4,212
June	4,201	780	2,158	2,823	4,981
Totals to June 30, 1916	13,735	2,358	6,924	9,169	16,093
July	4,140	729	1,983	2,886	4,869
August	5,244	708	2,453	3,499	5,952
September	5,839	663	2,705	3,797	6,502
October	4,496	638	2,282	2,852	5,134
Totals	33,454	5,096	16,347	22,203	38,550

TABLE No. 21. Number of Renewals, and Individuals Placed, by Sex.
San Francisco.

Month	Males			Females			Males and females		
	Positions furnished	Renewals	New individuals placed	Positions furnished	Renewals	New individuals placed	Positions furnished	Renewals	New individuals placed
February, 1916	102	5	97	34	3	31	136	8	128
March	747	76	671	132	20	112	879	96	783
April	1,205	254	951	308	45	263	1,513	299	1,214
May	1,433	438	995	285	47	238	1,718	485	1,233
June	1,854	379	1,475	353	61	292	2,207	440	1,767
Totals to June 30, 1916	5,341	1,152	4,189	1,112	176	936	6,453	1,328	5,125
July	1,465	299	1,166	260	46	214	1,725	345	1,380
August	1,864	680	1,184	309	48	261	2,173	728	1,445
September	2,327	797	1,530	245	60	185	2,572	857	1,715
October	1,841	893	948	337	148	189	2,178	1,041	1,137
Totals	12,838	3,821	9,017	2,263	478	1,785	15,101	4,299	10,802

TABLE No. 22. Number of Renewals, and Individuals Placed, by Sex. Oakland.

Month	Males			Females			Males and females		
	Positions furnished	Renewals	New individuals placed	Positions furnished	Renewals	New individuals placed	Positions furnished	Renewals	New individuals placed
February, 1916	54	9	45	39	15	24	93	24	69
March	365	80	285	136	41	95	501	121	380
April	449	117	332	141	37	104	590	154	436
May	438	223	215	187	71	116	625	294	331
June	393	198	195	171	77	94	564	275	289
Totals to June 30, 1916	1,699	627	1,072	674	241	433	2,373	868	1,505
July	549	288	261	188	34	154	737	322	415
August	654	310	344	149	59	90	803	369	434
September	614	282	332	187	61	126	801	343	458
October	531	282	249	182	93	89	713	375	338
Totals	4,047	1,789	2,258	1,380	488	892	5,427	2,277	3,150

TABLE No. 23. Number of Renewals, and Individuals Placed, by Sex. Sacramento.

Month	Males			Females			Males and females		
	Positions furnished	Renewals	New individuals placed	Positions furnished	Renewals	New individuals placed	Positions furnished	Renewals	New individuals placed
February, 1916	29	1	28	14	1	13	43	2	41
March	93	20	73	27	4	23	120	24	96
April	345	28	317	39	10	29	384	38	346
May	466	48	418	52	10	42	518	58	460
June	603	201	402	50	16	34	653	217	436
Totals to June 30, 1916	1,536	298	1,238	182	41	141	1,718	339	1,379
July	734	249	485	43	10	33	777	259	518
August	1,527	310	1,217	59	19	40	1,586	329	1,257
September	1,237	421	816	85	11	74	1,322	432	890
October	985	344	641	47	17	30	1,032	361	671
Totals	6,019	1,622	4,397	416	98	318	6,435	1,720	4,715

TABLE No. 24. Number of Renewals, and Individuals Placed, by Sex.
San Francisco, Oakland and Sacramento.

Month	Males			Females			Males and females		
	Positions furnished	Renewals	New individuals placed	Positions furnished	Renewals	New individuals placed	Positions furnished	Renewals	New individuals placed
February, 1916	185	15	170	87	19	68	272	34	238
March	1,205	176	1,029	295	65	230	1,500	241	1,259
April	1,999	399	1,600	488	92	396	2,487	491	1,996
May	2,337	709	1,628	524	128	396	2,861	837	2,024
June	2,850	778	2,072	574	154	420	3,424	932	2,492
Totals to June 30, 1916	8,576	2,077	6,499	1,968	458	1,510	10,544	2,535	8,009
July	2,748	836	1,912	491	90	401	3,239	926	2,313
August	4,045	1,300	2,745	517	126	391	4,562	1,426	3,136
September	4,178	1,500	2,678	517	132	385	4,695	1,632	3,063
October	3,357	1,519	1,838	566	258	308	3,923	1,777	2,146
Totals	22,904	7,232	15,672	4,059	1,064	2,995	26,963	8,296	18,667

Figures for Los Angeles not available.

TABLE No. 25. Percentage of Individuals Placed to Individuals Registered, by Sex
From February 1, 1916, to October 31, 1916.
San Francisco, Oakland and Sacramento.

Office	Males			Females			Total		
	Individuals registered	Individuals placed	Per cent of placed to registration	Individuals registered	Individuals placed	Per cent of placed to registration	Individuals registered	Individuals placed	Per cent of placed to registration
San Francisco	17,163	9,017	52.5	5,668	1,785	31.5	22,831	10,802	47.3
Oakland	4,096	2,258	55.1	2,198	892	40.6	6,294	3,150	50.0
Sacramento	5,974	4,397	73.6	1,069	318	29.7	7,043	4,715	66.9
Totals	27,233	15,672	57.5	8,935	2,995	33.3	36,168	18,667	51.6

Figures for Los Angeles not available.

TABLE No. 26. Registration of Applicants for Employment.

San Francisco.

Month	Male	Female	In town	Out of town	Total
February, 1916	2,661	698	3,284	75	3,359
March	1,559	551	2,048	62	2,110
April	1,552	575	2,058	69	2,127
May	1,570	708	2,200	78	2,278
June	1,835	921	2,646	110	2,756
Totals to June 30, 1916	9,177	3,453	12,236	394	12,630
July	1,777	529	2,183	123	2,306
August	1,855	563	2,264	154	2,418
September	2,280	484	2,622	142	2,764
October	2,074	639	2,530	183	2,713
Totals	17,163	5,668	21,835	996	22,831

TABLE No. 27. Registration of Applicants for Employment.

Oakland.

Month	Male	Female	In town	Out of town	Total
February, 1916	818	322	1,071	69	1,140
March	598	359	945	12	957
April	424	256	676	4	680
May	408	245	647	6	653
June	398	252	649	1	650
Totals to June 30, 1916	2,646	1,434	3,988	92	4,080
July	348	193	541	----------	541
August	434	201	633	2	635
September	360	176	536	----------	536
October	308	194	502	----------	502
Totals	4,096	2,198	6,200	94	6,294

TABLE No. 28. Registration of Applicants for Employment.

Sacramento.

Month	Male	Female	In town	Out of town	Total
February, 1916	690	119	805	4	809
March	377	117	491	3	494
April	412	141	551	2	553
May	504	125	617	12	629
June	485	97	576	6	582
Totals to June 30, 1916	2,468	599	3,040	27	3,067
July	713	88	796	5	801
August	1,312	128	1,428	12	1,440
September	807	137	932	12	944
October	674	117	787	4	791
Totals	5,974	1,069	6,983	60	7,043

TABLE No. 29. Registration of Applicants for Employment.
San Francisco, Oakland and Sacramento.

Month	Male	Female	In town	Out of town	Total
February, 1916	4,169	1,139	5,160	148	5,308
March	2,534	1,027	3,484	77	3,561
April	2,388	972	3,285	75	3,360
May	2,482	1,078	3,464	96	3,560
June	2,718	1,270	3,871	117	3,988
Totals to June 30, 1916	14,291	5,486	19,264	513	19,777
July	2,838	810	3,520	128	3,648
August	3,601	892	4,325	168	4,493
September	3,447	797	4,090	154	4,244
October	3,056	950	3,819	187	4,006
Totals	27,233	8,935	35,018	1,150	36,168

Figures for Los Angeles not available.

TABLE No. 30. Nativity and Citizenship of Applicants Registered From February 1, 1916, to June 30, 1916.
San Francisco, Oakland and Sacramento.

		San Francisco	Oakland	Sacramento	Total
Native born	Male	5,308	1,851	1,618	8,777
	Female	2,473	1,071	512	4,056
	Total	7,781	2,922	2,130	12,833
Foreign born	Total	4,849	1,158	937	6,944
Citizens	Male	1,888	430	382	2,700
	Female	451	183	54	688
	Total	2,339	613	436	3,388
Aliens	Male	1,981	365	468	2,814
	Female	529	180	33	742
	Total	2,510	545	501	3,556

Figures for Los Angeles not available.

TABLE No. 31. Marital Condition of Applicants Registered From February 1, 1916, to June 30, 1916.
San Francisco, Oakland and Sacramento.

		San Francisco	Oakland	Sacramento	Total
Single	Male	6,091	1,337	1,743	9,171
	Female	1,755	564	152	2,471
	Total	7,846	1,901	1,895	11,642
Married	Male	2,651	1,142	606	4,399
	Female	925	333	220	1,478
	Total	3,576	1,475	826	5,877
Widowed	Male	435	167	119	721
	Female	773	537	227	1,537
	Total	1,208	704	346	2,258

Figures for Los Angeles not available.

TABLE No. 32. Duration of Residence of Applicants Registered From February 1, 1916, to June 30, 1916.

San Francisco.

Residence	1 year and over			Under 1 year		
	Male	Female	Total	Male	Female	Total
In city	6,979	2,833	9,812	2,198	620	2,818
In state	7,971	3,026	10,997	1,206	427	1,633
In United States	8,778	3,225	12,003	399	228	627

TABLE No. 33. Duration of Residence of Applicants Registered From February 1, 1916, to June 30, 1916.

Oakland.

Residence	1 year and over			Under 1 year		
	Male	Female	Total	Male	Female	Total
In city	1,956	1,082	3,038	690	352	1,042
In state	2,394	1,326	3,720	252	108	360
In United States	2,569	1,395	3,964	77	39	116

TABLE No. 34. Duration of Residence of Applicants Registered From February 1, 1916, to June 30, 1916.

Sacramento.

Residence	1 year and over			Under 1 year		
	Male	Female	Total	Male	Female	Total
In city	1,371	343	1,714	1,097	256	1,353
In state	2,228	533	2,761	240	66	306
In United States	2,439	573	3,012	29	26	55

TABLE No. 35. Duration of Residence of Applicants Registered From February 1, 1916, to June 30, 1916.

San Francisco, Oakland and Sacramento.

Residence	1 year and over			Under 1 year		
	Male	Female	Total	Male	Female	Total
In city	10,306	4,258	14,564	3,985	1,228	5,213
In state	12,593	4,885	17,478	1,698	601	2,299
In United States	13,786	5,193	18,979	505	293	798

Figures for Los Angeles not available.

TABLE No. 36. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916.

San Francisco.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
MALE.				
AGRICULTURE.				
Dairy hands	101	87	78	61
Farm hands	268	119	115	105
Fruit pickers	28	69	47	32
Fruit packers	12	83	86	82
Gardeners	111	32	34	27
Others	27	20	19	19
BUILDING AND CONSTRUCTION.				
Bricklayers, masons, plasterers, helpers	40	54	41	34
Carpenters, joiners and helpers	420	177	178	172
Cement workers	38	16	18	13
Electrical workers	45	2	2	2
Marble and stone cutters	22	2	2	2
Painters, decorators, paperhangers, etc.	146	61	58	48
Plumbers, gas and steam fitters	85	27	20	15
Roofers, tinsmiths, sheet metal workers	10	1	1	1
Structural iron workers	9	5	4	4
Other distinct occupations	42	3	6	3
Building laborers	38	10	11	10
CLERICAL AND PROFESSIONAL.				
Bookkeepers, accountants and cashiers	208	13	26	8
Stenographers and typewriters	102	20	24	12
Office clerks	344	31	39	25
FOOD, BEVERAGES AND TOBACCO.				
Bakers	90	12	14	10
Brewery workers				
Butchers	57	5	5	5
Cigar, cigarette and tobacco workers				
Confectionery workers	9	3	3	3
Other distinct occupations	18			
Laborers	5			
HOTELS AND RESTAURANTS.				
Bartenders	20	1	1	1
Cooks and chefs	463	139	140	125
Dishwashers	336	408	381	348
Saloon porters	42	12	21	11
Waiters and busboys	319	199	235	175
Others	260	39	35	27
LUMBER.				
Sawmill hands	14	12	5	2
Woodsmen	16	32	27	24
Other distinct occupations	15	29	13	10
Laborers	9	16	16	16
METALS AND MACHINERY.				
Blacksmiths and blacksmith helpers	119	62	63	51
Blast furnace and rolling mill workers	5	8	8	6
Boilermakers and boilermaker helpers	37	45	21	22
Coremakers	3	2	1	
Machinists	179	93	89	71
Machine hands and helpers	89	12	11	9
Molders and molder helpers	3	3	2	2
Polishers, buffers and platers	5			
Other distinct occupations	68	18	20	11
Laborers	11	14	16	14

TABLE No. 36. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

San Francisco.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
MALE—Continued.				
MINING, OIL AND QUARRYING.				
Drillers	21			
Miners	71	15	11	12
Muckers	6	16	12	9
Quarrymen	2			
Others	5	2	2	2
PRINTING AND PUBLISHING.				
Bookbinders	3			
Job printers	8	1	1	1
Machine operators				
Pressmen and feeders	4	1		
Other distinct occupations	1			
TRANSPORTATION AND PUBLIC UTILITIES.				
Chauffeurs, cab and coach drivers	155	11	15	9
Draymen, teamsters, etc.	270	26	25	25
Freight handlers	14	101	110	105
Hostlers and stable hands	25	12	11	10
Linemen and electricians	45	6	7	6
Marine engineers and firemen	54	1	2	
Railroad conductors, engineers, firemen, etc.	23			
Railroad switchmen, flagmen, yardmen	4	2	1	1
Railroad laborers (section hands)	15	1,621	1,250	1,221
Seamen	14	10	7	
Street railway conductors and motormen	1			
Telephone and telegraph operators	1	2	3	1
Other distinct occupations	59	48	28	11
Laborers	17	43	45	42
WHOLESALE AND RETAIL TRADE.				
Agents, canvassers, solicitors, etc.	30	37	42	21
Bundlers and wrappers		1	1	
Clerks and salesmen	274	52	51	22
Deliverymen	15	13	8	7
Shipping and stock clerks	142	17	24	11
Packers, porters, etc.	36	3	4	3
Other distinct occupations	20	8	6	2
Laborers in stores	20	1	2	1
Laborers in yards (coal, lumber, etc.)	1			
WOOD WORKING AND FURNITURE.				
Cabinetmakers and finishers	19			
Machine wood workers	6	2	2	2
Piano and organ workers				
Upholsterers	3	2	2	
Other distinct occupations	23	9	10	7
Laborers	7			
CASUAL WORKERS.				
Cleaners	9	3	2	2
Handy men	126	45	43	39
Others	8	7	12	7

TABLE No. 36. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

San Francisco.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
MALE—Continued.				
MISCELLANEOUS.				
Elevator runners	69	17	21	17
Janitors	288	71	90	64
Messengers and errand boys	117	159	147	126
Porters (except store and saloon)	251	228	214	175
Stationary engineers	109	14	16	14
Stationary firemen	65	7	7	4
Watchmen	149	78	83	73
Laborers	2,021	2,070	1,775	1,615
Others	263	111	78	56
Total male	9,177	6,869	6,106	5,341
FEMALE.				
AGRICULTURE.				
Fruit pickers				
Fruit packers				
Others				
CLERICAL AND PROFESSIONAL.				
Bookkeepers, accountants and cashiers	129	3	4	3
Stenographers and typewriters	323	36	83	26
Other office clerks	177	16	23	14
FOOD, BEVERAGES AND TOBACCO.				
Cigar, cigarette and tobacco workers				
Confectionery workers	1			
Others	3	2	3	2
HOTELS AND RESTAURANTS.				
Chambermaids	502	110	116	83
Cooks	58	31	39	19
Housekeepers	153	16	14	8
Dishwashers	3	9	12	9
Waitresses	341	175	198	157
Others	22	20	14	8
MANUFACTURING.				
Operators—machine	24	6	6	6
Piece workers	195	275	315	275
PRINTING AND PUBLISHING.				
Bindery women				
Folders				
Press feeders				
Proofreaders				
PRIVATE HOMES.				
Companions	49	7	11	3
Cooks	234	73	73	44
Day workers	165	25	18	14
Domestics	562	436	593	374
Maids	10	5	5	3
Nurses, practical	98	10	7	3
Nurses, children's	108	26	14	5
Others	14	3	4	3
WHOLESALE AND RETAIL.				
Agents, canvassers, solicitors, etc.	4	2	3	2
Binders, packers and wrappers	1	2		
Cash girls	1			
Saleswomen	96	12	14	12
Stock clerks	4	5	7	5
Others	13	4	4	4

TABLE No. 36. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

San Francisco.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
FEMALE—Continued.				
MISCELLANEOUS.				
Laundry workers	60	25	30	26
Telephone operators	71	7	10	3
Others	32	1	1	1
Total female	3,453	1,342	1,621	1,112
Total male and female	12,630	8,211	7,727	6,453

TABLE No. 37. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916.

Oakland.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
MALE.				
AGRICULTURE.				
Dairy hands	10	31	33	26
Farm hands	90	36	41	29
Fruit pickers	8	1	1	1
Fruit packers				
Gardeners	85	71	79	64
Others	7	15	14	10
BUILDING AND CONSTRUCTION.				
Bricklayers, masons, plasterers, helpers	15	6	6	3
Carpenters, joiners and helpers	178	123	123	104
Cement workers	27	28	37	27
Electrical workers	57	8	8	5
Marble and stone cutters	4			
Painters, decorators, paperhangers, etc.	92	71	80	70
Plumbers, gas and steam fitters	25	6	7	6
Roofers, tinsmiths, sheet metal workers	6	5	6	2
Structural iron workers	5	1		
Other distinct occupations	25	1	1	1
Building laborers	62	130	117	111
CLERICAL AND PROFESSIONAL.				
Bookkeepers, accountants and cashiers	45	1	1	1
Stenographers and typewriters	20	2	2	1
Office clerks	89	5	6	3
FOOD, BEVERAGES AND TOBACCO.				
Bakers	22	7	8	7
Brewery workers	1			
Butchers	8			
Cigar, cigarette and tobacco workers				
Confectionery workers	1			
Other distinct occupations	5			
Laborers	33	6	6	4
HOTELS AND RESTAURANTS.				
Bartenders	4			
Cooks and chefs	142	49	62	35
Dishwashers	88	178	197	168
Saloon porters	6	2	2	1
Waiters and busboys	39	40	42	36
Others	36	28	30	27
LUMBER.				
Sawmill hands	23	2	5	1
Woodsmen	1			
Other distinct occupations	7		1	1
Laborers	34	89	93	84
METALS AND MACHINERY.				
Blacksmiths and blacksmith helpers	34	4	4	3
Blast furnace and rolling mill workers				
Boilermakers and boilermaker helpers	6			
Coremakers		1	1	1
Machinists	60	13	15	9
Machine hands and helpers	31	6	5	4
Molders and molder helpers	1			
Polishers, buffers and platers	4			
Other distinct occupations	11	4	5	2
Laborers	9	19	19	19

TABLE No. 37. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

Oakland.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
MALE—Continued.				
MINING, OIL AND QUARRYING.				
Drillers		4	4	1
Miners	11	6	5	4
Muckers	1			
Quarrymen				
Others	6	80	54	50
PRINTING AND PUBLISHING.				
Bookbinders	1			
Job printers	7			
Machine operators	1			
Pressmen and feeders	6			
Other distinct occupations	1			
TRANSPORTATION AND PUBLIC UTILITIES.				
Chauffeurs, cab and coach drivers	73	6	8	5
Draymen, teamsters, etc.	100	18	12	9
Freight handlers				
Hostlers and stable hands	2	4	4	2
Linemen and electricians				
Marine engineers and firemen	13	2	3	1
Railroad conductors, engineers, firemen, etc.	13			
Railroad switchmen, flagmen, yardmen	3			
Railroad laborers (section hands)	3	11	11	11
Seamen	3			
Street railway conductors and motormen				
Telephone and telegraph operators				
Other distinct occupations	18	9	9	9
Laborers	13	157	154	145
WHOLESALE AND RETAIL TRADE.				
Agents, canvassers, solicitors, etc.	19	54	56	54
Bundlers and wrappers	1			
Clerks and salesmen	109	11	12	6
Deliverymen	42	10	12	7
Shipping and stock clerks	19	2	1	1
Packers, porters, etc.	6	1	2	1
Other distinct occupations	9	2	2	2
Laborers in stores	7	7	7	5
Laborers in yards (coal, lumber, etc.)	8	24	29	17
WOOD WORKING AND FURNITURE.				
Cabinetmakers and finishers	5			
Machine wood workers	1	1	1	1
Piano and organ workers				
Upholsterers	2			
Other distinct occupations	4			
Laborers	11			
CASUAL WORKERS.				
Cleaners	11	11	9	5
Handy men	100	119	128	107
Others	8	14	15	14

TABLE No. 37. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

Oakland.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
MALE—Continued.				
MISCELLANEOUS.				
Elevator runners	22	3	3	1
Janitors	87	34	34	23
Messengers and errand boys	9	7	4	2
Porters (except store and saloon)	38	19	22	18
Stationary engineers	37	1	2	1
Stationary firemen	10	3	3	3
Watchmen	64	14	13	7
Laborers	156	288	295	283
Others	130	50	56	38
Total male	2,646	1,961	2,027	1,699
FEMALE.				
AGRICULTURE.				
Fruit pickers				
Fruit packers	2	10	10	8
Others				
CLERICAL AND PROFESSIONAL.				
Bookkeepers, accountants and cashiers	49	2	5	2
Stenographers and typewriters	85	25	30	22
Other office clerks	51	6	7	6
FOOD, BEVERAGES AND TOBACCO.				
Cigar, cigarette and tobacco workers				
Confectionery workers	1			
Others				
HOTELS AND RESTAURANTS.				
Chambermaids	115	40	49	37
Cooks	47	4	7	4
Housekeepers	49	10	9	5
Dishwashers	2	14	16	11
Waitresses	49	71	76	59
Others	6	9	11	8
MANUFACTURING.				
Operators—machine	2	5	5	5
Piece workers	20	19	22	19
PRINTING AND PUBLISHING.				
Bindery women				
Folders				
Press feeders				
Proofreaders				
PRIVATE HOMES.				
Companions	24	9	10	7
Cooks	86	42	44	29
Day workers	188	73	75	73
Domestics	386	466	570	298
Maids	25	27	38	21
Nurses, practical	60	27	31	25
Nurses, children's	79	18	21	12
Others	7	7	7	4

TABLE No. 37. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

Oakland.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
FEMALE—Continued.				
WHOLESALE AND RETAIL.				
Agents, canvassers, solicitors, etc.	1			
Binders, packers and wrappers				
Cash girls	2			
Saleswomen	38	12	15	10
Stock clerks	2	1	1	
Others	4	1	1	1
MISCELLANEOUS.				
Laundry workers	27	4	2	2
Telephone operators	2	1	3	1
Others	25	8	8	5
Total female	1,434	911	1,073	674
Total male and female	4,080	2,872	3,100	2,373

TABLE No. 38. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916.

Sacramento.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
MALE.				
AGRICULTURE.				
Dairy hands	77	45	40	30
Farm hands	217	187	180	164
Fruit pickers	35	67	67	65
Fruit packers	----------	4	4	4
Gardeners	16	14	14	14
Others	35	61	50	45
BUILDING AND CONSTRUCTION.				
Bricklayers, masons, plasterers, helpers	11	4	4	4
Carpenters, joiners and helpers	191	105	74	72
Cement workers	13	9	9	8
Electrical workers	18	----------	----------	----------
Marble and stone cutters	5	1	1	1
Painters, decorators, paperhangers, etc.	28	6	6	5
Plumbers, gas and steam fitters	11	----------	----------	----------
Roofers, tinsmiths, sheet metal workers	----------	----------	----------	----------
Structural iron workers	1	----------	----------	----------
Other distinct occupations	29	3	3	3
Building laborers	160	242	241	237
CLERICAL AND PROFESSIONAL.				
Bookkeepers, accountants and cashiers	7	1	1	1
Stenographers and typewriters	7	1	1	----------
Office clerks	15	----------	----------	----------
FOOD, BEVERAGES AND TOBACCO.				
Bakers	6	3	4	3
Brewery workers	----------	----------	----------	----------
Butchers	11	1	1	1
Cigar, cigarette and tobacco workers	1	----------	----------	----------
Confectionery workers	----------	1	1	1
Other distinct occupations	1	3	3	3
Laborers	11	18	18	18
HOTELS AND RESTAURANTS.				
Bartenders	2	----------	----------	----------
Cooks and chefs	110	38	37	26
Dishwashers	49	45	46	38
Saloon porters	1	1	2	1
Waiters and busboys	44	39	38	35
Others	22	4	4	4
LUMBER.				
Sawmill hands	9	----------	----------	----------
Woodsmen	24	40	36	35
Other distinct occupations	8	----------	----------	----------
Laborers	28	29	29	29
METALS AND MACHINERY.				
Blacksmiths and blacksmith helpers	41	10	9	8
Blast furnace and rolling mill workers	----------	----------	----------	----------
Boilermakers and boilermaker helpers	11	4	6	4
Coremakers	----------	----------	----------	----------
Machinists	20	3	3	3
Machine hands and helpers	14	3	3	2
Molders and molder helpers	1	----------	----------	----------
Polishers, buffers and platers	1	----------	----------	----------
Other distinct occupations	6	----------	----------	----------
Laborers	2	3	3	3

TABLE No. 38. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

Sacramento.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
MALE—Continued.				
Mining, Oil and Quarrying.				
Drillers	1			
Miners	19	5	4	4
Muckers	2	1	1	1
Quarrymen				
Others	3			
Printing and Publishing.				
Bookbinders				
Job printers				
Machine operators				
Pressmen and feeders				
Other distinct occupations				
Transportation and Public Utilities.				
Chauffeurs, cab and coach drivers	8			
Draymen, teamsters, etc.	205	170	160	159
Freight handlers	7	34	9	9
Hostlers and stable hands	12	6	6	6
Linemen and electricians	1			
Marine engineers and firemen	1			
Railroad conductors, engineers, firemen, etc.	5			
Railroad switchmen, flagmen, yardmen				
Railroad laborers (section hands)	48	163	105	105
Seamen	2			
Street railway conductors and motormen	2			
Telephone and telegraph operators	1			
Other distinct occupations	18	22	23	8
Laborers	432	366	353	328
Wholesale and Retail Trade.				
Agents, canvassers, solicitors, etc.	2	1	1	
Bundlers and wrappers				
Clerks and salesmen	47	1	1	1
Deliverymen	5			
Shipping and stock clerks				
Packers, porters, etc.	1			
Other distinct occupations	9	8	4	4
Laborers in stores	3	1	1	1
Laborers in yards (coal, lumber, etc.)				
Wood Working and Furniture.				
Cabinetmakers and finishers	1			
Machine wood workers	1			
Piano and organ workers				
Upholsterers	2	1	1	1
Other distinct occupations	1			
Laborers	2	2	2	2
Casual Workers.				
Cleaners	2			
Handy men	4	1	1	1
Others	4	2	2	

TABLE No. 38. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

Sacramento.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
MALE—Continued.				
MISCELLANEOUS.				
Elevator runners				
Janitors	18	6	5	5
Messengers and errand boys				
Porters (except store and saloon)	20	12	12	10
Stationary engineers	26	2	2	2
Stationary firemen	24	3	3	3
Watchmen	22	1	1	1
Laborers	188	25	20	16
Others	20	3	3	2
Total male	2,468	1,831	1,658	1,536
FEMALE.				
AGRICULTURE.				
Fruit pickers				
Fruit packers	4			
Others				
CLERICAL AND PROFESSIONAL.				
Bookkeepers, accountants and cashiers	10	1	1	1
Stenographers and typewriters	24	1	1	
Other office clerks	19	2	2	1
FOOD, BEVERAGES AND TOBACCO.				
Cigar, cigarette and tobacco workers	1			
Confectionery workers	2	2	2	1
Others	2			
HOTELS AND RESTAURANTS.				
Chambermaids	77	13	15	10
Cooks	9	13	9	4
Housekeepers	34	19	15	12
Dishwashers	2	2		
Waitresses	61	44	44	27
Others		1		
MANUFACTURING.				
Operators—machine				
Piece workers				
PRINTING AND PUBLISHING.				
Bindery women	2	1	1	1
Folders				
Press feeders				
Proofreaders				
PRIVATE HOMES.				
Companions	4	5	5	2
Cooks	90	48	39	28
Day workers	43	23	26	20
Domestics	85	116	94	57
Maids	3	4	4	3
Nurses, practical	15	4	4	3
Nurses, children's	18	4	3	2
Others		1	1	1

TABLE No. 38. Industries and Occupations—Showing Registrations, Help Wanted. Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

Sacramento.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
FEMALE—Continued.				
WHOLESALE AND RETAIL.				
Agents, canvassers, solicitors, etc.	1	9	3	2
Binders, packers and wrappers	1			
Cash girls	1			
Saleswomen	16	1	1	1
Stock clerks				
Others				
MISCELLANEOUS.				
Laundry workers	14	5	5	4
Telephone operators	5			
Others	56	6	4	2
Total female	599	325	279	182
Total male and female	3,067	2,156	1,937	1,718

TABLE No. 39. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916.

Los Angeles.

Industry and occupation	Registrations*	Help wanted	Referred	Reported placed
MALE.				
AGRICULTURE.				
Dairy hands		68	60	57
Farm hands		343	339	317
Fruit pickers		36	35	33
Fruit packers				
Gardeners		12	12	11
Others		76	74	71
BUILDING AND CONSTRUCTION.				
Bricklayers, masons, plasterers, helpers		10	7	6
Carpenters, joiners and helpers		269	252	244
Cement workers		2	2	2
Electrical workers		1	1	1
Marble and stone cutters				
Painters, decorators, paperhangers, etc.		11	13	11
Plumbers, gas and steam fitters		1	1	1
Roofers, tinsmiths, sheet metal workers		3	3	3
Structural iron workers				
Other distinct occupations		10	10	10
Building laborers		606	560	517
CLERICAL AND PROFESSIONAL.				
Bookkeepers, accountants and cashiers		5	5	3
Stenographers and typewriters		1		
Office clerks				
FOOD, BEVERAGES AND TOBACCO.				
Bakers		1	1	1
Brewery workers				
Butchers		3	3	3
Cigar, cigarette and tobacco workers				
Confectionery workers				
Other distinct occupations				
Laborers				
HOTELS AND RESTAURANTS.				
Bartenders				
Cooks and chefs		95	94	86
Dishwashers		133	136	129
Saloon porters		12	16	13
Waiters and busboys		27	28	26
Others		44	43	43
LUMBER.				
Sawmill hands				
Woodsmen				
Other distinct occupations				
Laborers		4	4	4
METALS AND MACHINERY.				
Blacksmiths and blacksmith helpers		28	27	25
Blast furnace and rolling mill workers				
Boilermakers and boilermaker helpers		1	1	1
Coremakers				
Machinists		39	39	38
Machine hands and helpers		10	7	7
Molders and molder helpers				
Polishers, buffers and platers		1		
Other distinct occupations		8	7	7
Laborers				

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*Registration figures for Los Angeles not available.

TABLE No. 39. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

Los Angeles.

Industry and occupation	Registrations*	Help wanted	Referred	Reported placed
MALE—Continued.				
MINING, OIL AND QUARRYING.				
Drillers				
Miners		87	88	83
Muckers		44	42	42
Quarrymen		23	23	23
Others		6	5	5
PRINTING AND PUBLISHING.				
Bookbinders				
Job Printers		1	1	1
Machine operators				
Pressmen and feeders				
Other distinct occupations		1	1	1
TRANSPORTATION AND PUBLIC UTILITIES.				
Chauffeurs, cab and coach drivers				
Draymen, teamsters, etc.		228	229	225
Freight handlers				
Hostlers and stable hands		4	4	4
Linemen and electricians				
Marine engineers and firemen				
Railroad conductors, engineers, firemen, etc.				
Railroad switchmen, flagmen, yardmen				
Railroad laborers (section hands)		1,548	1,522	1,521
Seamen				
Street railway conductors and motormen				
Telephone and telegraph operators				
Other distinct occupations		10	10	10
Laborers		274	272	271
WHOLESALE AND RETAIL TRADE.				
Agents, canvassers, solicitors, etc.				
Bundlers and wrappers				
Clerks and salesmen		1	2	
Deliverymen				
Shipping and stock clerks				
Packers, porters, etc.				
Other distinct occupations		4	3	3
Laborers in stores				
Laborers in yards (coal, lumber, etc.)		4	4	4
WOOD WORKING AND FURNITURE.				
Cabinetmakers and finishers		7	6	6
Machine wood workers		1	1	1
Piano and organ workers				
Upholsterers		2	2	2
Other distinct occupations		2	3	3
Laborers				
CASUAL WORKERS.				
Cleaners				
Handy men		2	2	2
Others				

TABLE No. 39. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

Los Angeles.

Industry and occupation	Registrations*	Help wanted	Referred	Reported placed
MALE—Continued.				
MISCELLANEOUS.				
Elevator runners		1	1	1
Janitors		2	2	2
Messengers and errand boys		1	1	1
Porters (except store and saloon)		34	32	31
Stationary engineers		10	9	9
Stationary firemen		2	2	2
Watchmen		2	3	2
Laborers		63	59	57
Movies		1,128	1,129	1,128
Others		51	50	49
Total male		5,403	5,288	5,159
FEMALE.				
AGRICULTURE.				
Fruit pickers		32	32	32
Fruit packers		40	40	40
Others		2		
CLERICAL AND PROFESSIONAL.				
Bookkeepers, accountants and cashiers				
Stenographers and typewriters		1		
Other office clerks				
FOOD, BEVERAGES AND TOBACCO.				
Cigar, cigarette and tobacco workers				
Confectionery workers				
Others				
HOTELS AND RESTAURANTS.				
Chambermaids		7	6	5
Cooks		23	9	9
Housekeepers		1		
Dishwashers		5	5	4
Waitresses		25	15	14
Others		3	5	3
MANUFACTURING.				
Operators—machine				
Piece workers				
PRINTING AND PUBLISHING.				
Bindery women				
Folders				
Press feeders				
Proofreaders				
PRIVATE HOMES.				
Companions		2		
Cooks		21	14	12
Day workers		1	1	1
Domestics		118	56	44
Maids		2	2	2
Nurses, practical		4	2	2
Nurses, children's		6	6	2
Others		1	1	2

TABLE No. 39. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

Los Angeles.

Industry and occupation	Registrations*	Help wanted	Referred	Reported placed
FEMALE—Continued.				
WHOLESALE AND RETAIL.				
Agents, canvassers, solicitors, etc.				
Binders, packers and wrappers				
Cash girls				
Saleswomen		1	1	1
Stock clerks				
Others		1		
MISCELLANEOUS.				
Laundry workers		1	1	1
Telephone operators				
Movies		216	216	216
Others				
Total female		513	412	390
Total male and female		5,916	5,700	5,549

*Registration figures for Los Angeles not available.

TABLE No. 40. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916.

All Offices.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
MALE.				
AGRICULTURE.				
Dairy hands	188	231	211	174
Farm hands	575	685	675	615
Fruit pickers	71	173	150	131
Fruit packers	12	87	90	86
Gardeners	212	129	139	116
Others	69	172	157	145
BUILDING AND CONSTRUCTION.				
Bricklayers, masons, plasterers, helpers	66	74	58	47
Carpenters, joiners and helpers	789	674	627	592
Cement workers	78	55	66	50
Electrical workers	120	11	11	8
Marble and stone cutters	31	3	3	3
Painters, decorators, paperhangers, etc.	266	149	157	134
Plumbers, gas and steam fitters	121	34	28	22
Roofers, tinsmiths, sheet metal workers	16	9	10	6
Structural iron workers	15	6	4	4
Other distinct occupations	96	17	20	17
Building laborers	260	988	929	875
CLERICAL AND PROFESSIONAL.				
Bookkeepers, accountants and cashiers	260	20	33	13
Stenographers and typewriters	129	24	27	13
Office clerks	448	36	45	28
FOOD, BEVERAGES AND TOBACCO.				
Bakers	118	23	27	21
Brewery workers	1	----------	----------	----------
Butchers	76	9	9	9
Cigar, cigarette and tobacco workers	1	----------	----------	----------
Confectionery workers	10	4	4	4
Other distinct occupations	24	3	3	3
Laborers	49	24	24	22
HOTELS AND RESTAURANTS.				
Bartenders	26	1	1	1
Cooks and chefs	715	321	333	272
Dishwashers	473	764	760	683
Saloon porters	49	27	41	26
Waiters and busboys	402	305	343	272
Others	318	115	112	101
LUMBER.				
Sawmill hands	46	14	10	3
Woodsmen	41	72	63	59
Other distinct occupations	30	29	14	11
Laborers	71	138	142	133
METALS AND MACHINERY.				
Blacksmiths and blacksmith helpers	194	104	103	87
Blast furnace and rolling mill workers	5	8	8	6
Boilermakers and boilermaker helpers	54	50	28	27
Coremakers	3	3	2	1
Machinists	259	148	146	121
Machine hands and helpers	134	31	26	22
Molders and molder helpers	5	3	2	2
Polishers, buffers and platers	10	1	----------	----------
Other distinct occupations	85	30	32	20
Laborers	22	36	38	36

Table No. 40. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

All Offices.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
MALE—Continued.				
MINING, OIL AND QUARRYING.				
Drillers	22	4	4	1
Miners	101	113	108	103
Muckers	9	61	55	52
Quarrymen	2	23	23	23
Others	14	88	61	57
PRINTING AND PUBLISHING.				
Bookbinders	4			
Job printers	15	2	2	2
Machine operators	1			
Pressmen and feeders	10	1		
Other distinct occupations	2	1	2	1
TRANSPORTATION AND PUBLIC UTILITIES.				
Chauffeurs, cab and coach drivers	236	17	23	14
Draymen, teamsters, etc.	575	442	426	418
Freight handlers	21	135	119	114
Hostlers and stable hands	39	26	25	22
Linemen and electricians	46	6	7	6
Marine engineers and firemen	68	3	5	1
Railroad conductors, engineers, firemen, etc.	41			
Railroad switchmen, flagmen, yardmen	7	2		1
Railroad laborers (section hands)	66	3,343	2,888	2,858
Seamen	19	10	7	
Street railway conductors and motormen	3			
Telephone and telegraph operators	2	2	3	1
Other distinct occupations	95	89	70	38
Laborers	462	840	824	786
WHOLESALE AND RETAIL TRADE.				
Agents, canvassers, solicitors, etc.	51	92	99	75
Bundlers and wrappers	1	1	1	
Clerks and salesmen	430	65	66	29
Deliverymen	62	23	20	14
Shipping and stock clerks	161	19	25	12
Packers, porters, etc.	43	4	6	4
Other distinct occupations	38	22	15	11
Laborers in stores	30	9	10	7
Laborers in yards (coal, lumber, etc.)	9	28	33	21
WOOD WORKING AND FURNITURE.				
Cabinetmakers and finishers	25	7	6	6
Machine wood workers	8	4	4	4
Piano and organ workers				
Upholsterers	7	5	5	3
Other distinct occupations	28	11	13	10
Laborers	20	2	2	2
CASUAL WORKERS.				
Cleaners	22	14	11	7
Handy men	230	167	174	149
Others	20	23	29	21

TABLE No. 40. Industries and Occupations—Showing Registrations, Help Wanted. Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

All Offices.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
MALE—Continued.				
MISCELLANEOUS.				
Elevator runners	91	21	25	19
Janitors	393	113	131	94
Messengers and errand boys	126	167	152	129
Porters (except store and saloon)	309	293	280	234
Stationary engineers	172	27	29	26
Stationary firemen	99	15	15	12
Watchmen	235	95	100	83
Laborers	2,365	2,446	2,149	1,971
Movies		1,128	1,129	1,128
Others	413	215	187	145
Total male	14,291	16,064	15,079	13,735
FEMALE.				
AGRICULTURE.				
Fruit pickers		32	32	32
Fruit packers	6	50	50	48
Others		2		
CLERICAL AND PROFESSIONAL.				
Bookkeepers, accountants and cashiers	188	6	10	6
Stenographers and typewriters	432	63	114	48
Other office clerks	247	24	32	21
FOOD, BEVERAGES AND TOBACCO.				
Cigar, cigarette and tobacco workers	1			
Confectionery workers	4	2	2	1
Others	5	2	3	2
HOTELS AND RESTAURANTS.				
Chambermaids	694	170	186	135
Cooks	114	71	64	36
Housekeepers	236	46	38	25
Dishwashers	7	30	33	24
Waitresses	451	315	333	257
Others	28	33	30	19
MANUFACTURING.				
Operators—machine	26	11	11	11
Piece workers	215	294	337	294
PRINTING AND PUBLISHING.				
Bindery women	2	1	1	1
Folders				
Press feeders				
Proofreaders				
PRIVATE HOMES.				
Companions	77	23	26	12
Cooks	410	184	170	113
Day workers	396	122	120	108
Domestics	1,033	1,136	1,313	773
Maids	38	38	49	29
Nurses, practical	173	45	44	33
Nurses, children's	205	54	44	21
Others	21	12	13	10

TABLE No. 40. Industries and Occupations—Showing Registrations, Help Wanted, Number Referred and Number Reported Placed From February 1, 1916, to June 30, 1916—Continued.

All Offices.

Industry and occupation	Registrations	Help wanted	Referred	Reported placed
FEMALE—Continued.				
WHOLESALE AND RETAIL.				
Agents, canvassers, solicitors, etc.	6	11	6	4
Binders, packers and wrappers	2	2		
Cash girls	4			
Saleswomen	150	26	31	24
Stock clerks	6	6	8	5
Others	17	6	5	5
MISCELLANEOUS.				
Laundry workers	101	35	38	33
Telephone operators	78	8	13	4
Movies		216	216	216
Others	113	15	13	8
Total female	5,486	3,091	3,385	2,358
Total male and female	19,777	19,155	18,464	16,093

TABLE No. 41. Number Wanted and Number Placed by Industries From February 1, 1916, to June 30, 1916.
San Francisco.

Industry	Males		Females		Total	
	Number wanted	Number placed	Number wanted	Number placed	Number wanted	Number placed
Agriculture	410	326	------	------	410	326
Building and construction	358	304	------	------	358	304
Clerical and professional	64	45	55	43	119	88
Foods, beverages and tobacco	20	18	2	2	22	20
Hotels, restaurants, etc.	798	687	361	284	1,159	971
Lumber	89	52	------	------	89	52
Manufacturing (not elsewhere specified)	------	------	281	281	281	281
Metals and machinery	257	186	------	------	257	186
Mining, oil and quarrying	33	23	------	------	33	23
Motion pictures	------	------	------	------	------	------
Printing and publishing	2	1	------	------	2	1
Private homes	------	------	585	449	585	449
Transportation and public utilities	1,883	1,431	------	------	1,883	1,431
Wholesale and retail	132	67	25	23	157	90
Wood working and furniture	13	9	------	------	13	9
All others	2,810	2,192	33	30	2,843	2,222
Totals	6,869	5,341	1,342	1,112	8,211	6,453

TABLE No. 42. Number Wanted and Number Placed by Industries From February 1, 1916, to June 30, 1916.
Oakland.

Industry	Males		Females		Total	
	Number wanted	Number placed	Number wanted	Number placed	Number wanted	Number placed
Agriculture	154	130	10	8	164	138
Building and construction	379	329	------	------	379	329
Clerical and professional	8	5	33	30	41	35
Foods, beverages and tobacco	13	11	------	------	13	11
Hotels, restaurants, etc.	297	267	148	124	445	391
Lumber	91	86	------	------	91	86
Manufacturing (not elsewhere specified)	------	------	24	24	24	24
Metals and machinery	47	38	------	------	47	38
Mining, oil and quarrying	90	55	------	------	90	55
Motion pictures	------	------	------	------	------	------
Printing and publishing	------	------	------	------	------	------
Private homes	------	------	669	469	669	469
Transportation and public utilities	207	182	------	------	207	182
Wholesale and retail	111	93	14	11	125	104
Wood working and furniture	1	1	------	------	1	1
All others	563	502	13	8	576	510
Totals	1,961	1,699	911	674	2,872	2,373

TABLE No. 43. Number Wanted and Number Placed by Industries From February 1, 1916, to June 30, 1916.
Sacramento.

Industry	Males		Females		Total	
	Number wanted	Number placed	Number wanted	Number placed	Number wanted	Number placed
Agriculture	378	322			378	322
Building and construction	370	330			370	330
Clerical and professional	2	1	4	2	6	3
Foods, beverages and tobacco	26	26	2	1	28	27
Hotels, restaurants, etc.	127	104	92	53	219	157
Lumber	69	64			69	64
Manufacturing (not elsewhere specified)						
Metals and machinery	23	20			23	20
Mining, oil and quarrying	6	5			6	5
Motion pictures						
Printing and publishing			1	1	1	1
Private homes			205	116	205	116
Transportation and public utilities	761	615			761	615
Wholesale and retail	11	6	10	3	21	9
Wood working and furniture	3	3			3	3
All others	55	40	11	6	66	46
Totals	1,831	1,536	325	182	2,156	1,718

TABLE No. 44. Number Wanted and Number Placed by Industries From February 1, 1916, to June 30, 1916.
Los Angeles.

Industry	Males		Females		Total	
	Number wanted	Number placed	Number wanted	Number placed	Number wanted	Number placed
Agriculture	535	489	74	72	609	561
Building and construction	913	795			913	795
Clerical and professional	6	3	1		7	3
Foods, beverages and tobacco	4	4			4	4
Hotels, restaurants, etc.	311	297	64	35	375	332
Lumber	4	4			4	4
Manufacturing (not elsewhere specified)						
Metals and machinery	87	78			87	78
Mining, oil and quarrying	160	153			160	153
Motion pictures	1,128	1,128	216	216	1,344	1,344
Printing and publishing	2	2			2	2
Private homes			155	65	155	65
Transportation and public utilities	2,064	2,031			2,064	2,031
Wholesale and retail	9	7	2	1	11	8
Wood working and furniture	12	12			12	12
All others	168	156	1	1	169	157
Totals	5,403	5,159	513	390	5,916	5,549

TABLE No. 45. Number Wanted and Number Placed by Industries From February 1, 1916, to June 30, 1916.
All Offices.

Industry	Males		Females		Total	
	Number wanted	Number placed	Number wanted	Number placed	Number wanted	Number placed
Agriculture	1,477	1,267	84	80	1,561	1,347
Building and construction	2,020	1,758	-------	-------	2,020	1,758
Clerical and professional	80	54	93	75	173	129
Foods, beverages and tobacco	63	59	4	3	67	62
Hotels, restaurants, etc.	1,533	1,355	665	496	2,198	1,851
Lumber	253	206	-------	-------	253	206
Manufacturing (not elsewhere specified)	-------	-------	305	305	305	305
Metals and machinery	414	322	-------	-------	414	322
Mining, oil and quarrying	289	236	-------	-------	289	236
Motion pictures	1,128	1,128	216	216	1,344	1,344
Printing and publishing	4	3	1	1	5	4
Private homes	-------	-------	1,614	1,099	1,614	1,099
Transportation and public utilities	4,915	4,259	-------	-------	4,915	4,259
Wholesale and retail	263	173	51	38	314	211
Wood working and furniture	29	25	-------	-------	29	25
All others	3,596	2,890	58	45	3,654	2,935
Totals	16,064	13,735	3,091	2,358	19,155	16,093

PART III.

ORGANIZED LABOR.

In this chapter are presented figures showing the rates of wages and hours of labor on January 1, 1916, in some 467 unions of the state. There is also indicated by foot notes changes in wages and hours made since January 1, 1914, and of which we were able to obtain record. The number of unions reporting does not, of course, represent all the labor organizations in the state.

We have continued the classification adopted in the previous biennial report. This classification is as follows:

CLASSIFICATION OF LABOR ORGANIZATIONS.

I. BUILDING, STONE WORKING, ETC.—
  Stone working.
  Building and paving trades.
  Building and street labor.
II. TRANSPORTATION—
  Railways.
  Navigation.
  Teaming and cab driving.
  Freight handling.
  Telegraphs.
III. CLOTHING AND TEXTILES—
  Garments.
  Shirts, collars and laundry.
  Hats, caps and furs.
  Boots, shoes and gloves.
  Textiles.
IV. METALS, MACHINERY AND SHIPBUILDING—
  Iron and steel.
  Other metals.
  Shipbuilding.
V. PRINTING, BINDING, ETC.—
VI. WOOD WORKING AND FURNITURE—
VII. FOOD AND LIQUORS—
  Food products.
  Beverages.
VIII. THEATERS AND MUSIC—
IX. TOBACCO—
X. RESTAURANTS, TRADE, ETC.—
  Hotels and restaurants.
  Barbering.
  Retail trade.
XI. PUBLIC EMPLOYMENT—
XII. STATIONARY ENGINEMEN—
XIII. MISCELLANEOUS—
  Paper and paper goods.
  Leather and leather goods.
  Glass and glassware.
  Cement and clay products.
  Other distinct trades.
  Mixed employment.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		I. Building, Stone Working, etc.
		(a) STONE WORKING.
		Granite Cutters—
1	Los Angeles	Granite Cutters' International Association of America
		Marble Workers—
2	San Francisco	International Marble Workers' Union, No. 38
		Paving Block Cutters—
3	Kenwood	Paving Cutters' Union of the United States and Canada, No. 120.
4	Santa Rosa	Paving Cutters' Union of the United States and Canada, No. 31.
		Quarrymen—
5	Knowles	Quarry Workers' International Union of North America, No. 35.
6	Rocklin	Quarry Workers' International Union of North America, No. 43.
		(b) BUILDING AND PAVING TRADES.
		Bricklayers and Masons—
7	El Centro	Bricklayers, Masons and Plasterers' International Union of America, No. 23.
8	Fresno	Bricklayers, Masons and Plasterers' International Union of America, No. 1.
9	Los Angeles	Bricklayers, Masons and Plasterers' International Union of America, No. 2.
10	Pasadena	Bricklayers, Masons and Plasterers' International Union of America, No. 15.
11	San Jose	Bricklayers, Masons and Plasterers' International Union of America, No. 10.
12	Santa Monica	Bricklayers, Masons and Plasterers' International Union of America, No. 18.
13	Visalia	Bricklayers, Masons and Plasterers' International Union of America, No. 21.
		Carpenters and Joiners—
14	Alameda	United Brotherhood of Carpenters and Joiners of America, No. 194.
15	Bakersfield	United Brotherhood of Carpenters and Joiners of America, No. 743.
16	Berkeley	United Brotherhood of Carpenters and Joiners of America, No. 1158.
17	Berkeley (So.)	United Brotherhood of Carpenters and Joiners of America, No. 2532.
18	Eureka	United Brotherhood of Carpenters and Joiners of America, No. 1040.
19	Gilroy	United Brotherhood of Carpenters and Joiners of America, No. 354.
20	Hanford	United Brotherhood of Carpenters and Joiners of America, No. 1043.
21	Haywards	United Brotherhood of Carpenters and Joiners of America, No. 815.
22	Lodi	United Brotherhood of Carpenters and Joiners of America, No. 1641.
23	Long Beach	United Brotherhood of Carpenters and Joiners of America, No. 710.

WAGES AND HOURS OF LABOR ON JANUARY 1, 1916.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Granite cutters	Male	Day	$5 00	8	44	1
Bed rubbers	Male	Day	4 00	8	48	2
Carvers	Male	Day	5 50	8	44	
Cutters	Male	Day	4 50	8	44	
Polishers	Male	Day	3 50	8	48	
Setters	Male	Day	5 00	8	44	
Cutters	Male	Piece	---------------	8	48	3
Cutters	Male	Piece	Av.wk. 15 00	8	48	4
Engineers	Male	Day	[1]4 00	8	44	5
Laborers	Male	Day	[2]2 75	8	44	
Quarrymen	Male	Day	[3]3 25	8	44	
Blacksmiths	Male	Day	[4]5 00	8	44	6
Engineers	Male	Day	[5]4 00	8	44	
Quarrymen	Male	Day	[6]3 75	8	44	
Bricklayers	Male	Hour	81¼	8	44	7
Bricklayers	Male	Hour	87½	8	44	8
Bricklayers	Male	Hour	75	8	44	9
Bricklayers	Male	Hour	75	8	44	10
Bricklayers	Male	Hour	87½	8	44	11
Bricklayers	Male	Hour	75	8	44	12
Bricklayers	Male	Hour	87½	8	44	13
Carpenters	Male	Day	5 00	8	44	14
Carpenters	Male	Day	5 00	8	44	15
Carpenters	Male	Day	5 00	8	44	16
Carpenters	Male	Day	5 00	8	44	17
Carpenters	Male	Day	4 00	8	48	18
Carpenters	Male	Day	4 00	8	48	19
Carpenters	Male	Day	4 50	8	48	20
Carpenters	Male	Day	5 00	8	44	21
Carpenters	Male	Day	4 00	8	48	22
Carpenters	---------	---------	---------------	-------	-------	23

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[1] Engineers on June 1, 1914, wages increased from $3.00.
[2] Laborers, on June 1, 1914, wages increased from $2.25.
[3] Quarrymen, June 1, 1914, wages increased from $3.00.
[4] June 1, 1915, wages increased from $4.50 per day; hours reduced to 48 weekly.
[5] June 1, 1915, wages increased from $3.50 per day; hours reduced to 48 weekly.
[6] June 1, 1915, wages increased from $3.25 per day; hours reduced to 48 weekly.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		I. **Building, Stone Working, etc.**—Continued.
		(b) BUILDING AND PAVING TRADES—*Continued.*
		Carpenters and Joiners—Continued.
24	Los Angeles	United Brotherhood of Carpenters and Joiners of America, No. 2516.
25	Los Angeles	United Brotherhood of Carpenters and Joiners of America, No. 158.
26	Los Gatos	United Brotherhood of Carpenters and Joiners of America, No. 844.
27	Marysville	United Brotherhood of Carpenters and Joiners of America, No. 1517.
28	Merced	United Brotherhood of Carpenters and Joiners of America, No. 1202.
29	Mill Valley	United Brotherhood of Carpenters and Joiners of America, No. 1710.
30	Monterey	United Brotherhood of Carpenters and Joiners of America, No. 1451.
31	Oakland	United Brotherhood of Carpenters and Joiners of America, No. 36.
32	Oakland	United Brotherhood of Carpenters and Joiners of America, No. 1473.
33	Oakland	United Brotherhood of Carpenters and Joiners of America, No. 1667.
34	Oakland	Amalgamated Society of Carpenters and Joiners, No. 2533.
35	Oroville	United Brotherhood of Carpenters and Joiners of America, No. 1376.
36	Pacific Grove	United Brotherhood of Carpenters and Joiners of America, No. 806.
37	Palo Alto	United Brotherhood of Carpenters and Joiners of America, No. 668.
38	Pasadena	United Brotherhood of Carpenters and Joiners of America, No. 769.
39	Petaluma	United Brotherhood of Carpenters and Joiners of America, No. 981.
40	Porterville	United Brotherhood of Carpenters and Joiners of America, No. 1688.
41	Redwood City	United Brotherhood of Carpenters and Joiners of America, No. 1408.
42	Richmond	United Brotherhood of Carpenters and Joiners of America, No. 642.
43	Roseville	United Brotherhood of Carpenters and Joiners of America, No. 1928.
44	Sacramento	United Brotherhood of Carpenters and Joiners of America, No. 586.
45	Sacramento	Amalgamated Society of Carpenters and Joiners, Branch 2549.
46	Salinas	United Brotherhood of Carpenter and Joiners of America, No. 925.
47	San Bernardino	United Brotherhood of Carpenter and Joiners of America, No. 944.
48	San Bruno	United Brotherhood of Carpenter and Joiners of America. No. 848.
49	San Diego	United Brotherhood of Carpenter and Joiners of America, No. 810.
50	San Diego	Amalgamated Society of Carpenters and Joiners, Branch 2553.
51	San Francisco	United Brotherhood of Carpenter and Joiners of America, No. 22.
52	San Francisco	United Brotherhood of Carpenter and Joiners of America, No. 304.
53	San Francisco	United Brotherhood of Carpenter and Joiners of America, No. 483.
54	San Francisco	United Brotherhood of Carpenter and Joiners of America, No. 616.
55	San Jose	United Brotherhood of Carpenter and Joiners of America, No. 316.

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Carpenters	Male	Day		8	48	24
Carpenters	Male	Day	4 00	8	48	25
Carpenters	Male	Day	5 00	8	44	26
Carpenters	Male	Day	4 50	8	48	27
Carpenters	Male	Day	4 00	8	48	28
Carpenters	Male	Day	5 00	8	44	29
Carpenters	Male	Day	4 50	8	44	30
Carpenters	Male	Day	5 00	8	44	31
Carpenters	Male	Day	5 00	8	44	32
Carpenters	Male	Day	5 00	8	44	33
Carpenters	Male	Day	5 00	8	44	34
Carpenters	Male	Day	4 00	8	48	35
Carpenters	Male	Day	4 50	8	44	36
Carpenters	Male	Day	5 00	8	44	37
Carpenters	Male	Day	4 00	8	44	38
Carpenters	Male	Day	4 00	8	48	39
Carpenters	Male	Day	4 00	8	48	40
Carpenters	Male	Day	5 00	8	44	41
Carpenters	Male	Day	4 50	8	48	42
Carpenters	Male	Day	4 00	8	48	43
Carpenters	Male	Day	5 00	8	44	44
Carpenters	Male	Day	5 00	8	44	45
Carpenters	Male	Day	4 00	8	48	46
Carpenters	Male	Day	4 00	8	48	47
Carpenters	Male	Day	5 00	8	44	48
Millmen	Male	Day	4 50	8	48	
Carpenters	Male	Day	4 00	8	44	49
Carpenters	Male	Day	3 50	8	44	50
Carpenters	Male	Day	5 00	8	44	51
Carpenters	Male	Day	5 00	8	44	52
Carpenters	Male	Day	5 00	8	44	53
Stairbuilders	Male	Day	5 50	8	44	54
Carpenters	Male	Day	5 00	8	44	55

LABOR ORGANIZATIONS: SHOWING RATES OF

No.	Locality	Trade and organization
		I. Building, Stone Working, etc.—Continued.
		(b) BUILDING AND PAVING TRADES—*Continued.*
		Carpenters and Joiners—Continued.
56	San Rafael	United Brotherhood of Carpenter and Joiners of America, No. 35.
57	Santa Barbara	United Brotherhood of Carpenter and Joiners of America, No. 1062.
58	Santa Cruz	United Brotherhood of Carpenter and Joiners of America, No. 821.
59	Santa Monica	United Brotherhood of Carpenter and Joiners of America, No. 1400.
60	Santa Rosa	United Brotherhood of Carpenter and Joiners of America, No. 751.
61	Stockton	United Brotherhood of Carpenter and Joiners of America, No. 266.
62	Taft	United Brotherhood of Carpenter and Joiners of America, No. 1774.
63	Watsonville	United Brotherhood of Carpenter and Joiners of America, No. 771.
64	Woodland	United Brotherhood of Carpenter and Joiners of America, No. 1381.
		Cement Workers—
65	Los Angeles	American Brotherhood of Cement Workers, No. 3
66	San Jose	American Brotherhood of Cement Workers, No. 5
		Electrical Workers—
67	Bakersfield	International Brotherhood of Electrical Workers of America, No 428.
68	Eureka	International Brotherhood of Electrical Workers of America, No. 482.
69	Fresno	International Brotherhood of Electrical Workers of America, No. 169.
70	Los Angeles	International Brotherhood of Electrical Workers of America, No. 61.
71	Modesto	International Brotherhood of Electrical Workers of America, No. 684.
72	Oakland	International Brotherhood of Electrical Workers of America, No. 595.
73	Pasadena	International Brotherhood of Electrical Workers of America, No. 418.
74	Sacramento	International Brotherhood of Electrical Workers of America, No. 340.
75	San Bernardino	International Brotherhood of Electrical Workers of America, No. 477.
76	San Francisco	International Brotherhood of Electrical Workers of America, No. 537.
77	San Jose	International Brotherhood of Electrical Workers of America, No. 332.
78	San Mateo	International Brotherhood of Electrical Workers of America, No. 617.
79	Santa Ana	International Brotherhood of Electrical Workers of America, No. 311.

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Carpenters	Male	Day	5 00	8	44	56
Carpenters	Male	Day	4 00	8	48	57
Carpenters	Male	Day	4 00	8	44	58
Carpenters	Male	Day	4 00	8	48	59
Carpenters	Male	Day	[7]4 50	8	44	60
Carpenters	Male	Day	4 40	8	44	61
Carpenters	Male	Day	5 00	8	48	62
Carpenters	Male	Day	4 50	8	48	63
Carpenters	Male	Day	4 00	8	48	64
Finishers	Male	Day	5 00	8	48	65
Laborers	Male	Day	3 00	8	48	
Finishers	Male	Day	6 00	8	44	66
Finishers' helpers	Male	Day	5 00	8	44	
Laborers	Male	Day	4 00	8	44	
Lineman	Male	Day	4 00	8	48	67
Wiremen	Male	Day	5 00	8	44	
Cable splicers	Male	Day	4 75	8	48	68
Linemen	Male	Day	4 00	8	48	
Wiremen	Male	Day	4 00	8	48	
Cable splicers	Male	Day	4 75	8	48	69
Linemen	Male	Day	4 00	8	48	
Wiremen	Male	Day	4 00	8	48	
Cable splicers	Male	Day	4 00–4 75	8	48	70
Linemen	Male	Day	3 75–4 00	8	48–54	
Wiremen	Male	Day	4 00	8	48	
Cable splicers	Male	Day	4 75	8	48	71
Linemen	Male	Day	4 00	8	48	
Wiremen	Male	Day	4 00	8	48	
Inside wiremen	Male	Day	5 00	8	44	72
Groundmen	Male	Day	2 50–3 00	8	48	73
Linemen	Male	Day	4 00	8	48	
Electrical workers	Male	Day	5 00	8	44	74
Linemen, electric light	Male	Day	3 50–4 00	9	54	75
Linemen, telephone	Male	Day	4 00	8	48	
Cable splicers—						76
(a) Electric light:						
Journeymen	Male	Day	5 50	8	44	
Helpers	Male	Day	3 25	8	44	
(b) Telephone						
Journeymen	Male	Day	4 75	8	48	
Helpers	Male	Day	3 00	8	48	
Electrical workers	Male	Day	5 00	8	44	77
Inside wiremen	Male	Day	5 00	8	44	78
Linemen	Male	Day	4 00	8	48	79

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[7] On May 1, 1914, wages increased from $4.00 per day; hours reduced from 48 per week.

No.	Locality	Trade and organization
		I. Building, Stone Working, etc.—Continued.
		(b) BUILDING AND PAVING TRADES—Continued.
		Electrical Workers—Continued.
80	Santa Rosa	International Brotherhood of Electrical Workers of America, No. 594.
81	Stockton	International Brotherhood of Electrical Workers of America, No. 207.
	Stockton	International Brotherhood of Electrical Workers of America, No. 591.
82	Vallejo	International Brotherhood of Electrical Workers of America, No. 180.
		Elevator Constructors—
83	San Francisco	International Union of Elevator Constructors, No. 8
		House Movers—
84	Sacramento	House Raisers and Movers, No. 12314
		Housesmiths and Bridgemen—
85	Los Angeles	International Association of Bridge and Structural Iron Workers, Pile Drivers and Ornamental Iron Workers, No. 51.
86	Sacramento	International Association of Bridge and Structural Iron Workers, Pile Drivers and Ornamental Iron Workers, No. 118.
87	San Francisco	International Association of Bridge and Structural Iron Workers, Pile Drivers and Ornamental Iron Workers, No. 77.
88	San Jose	International Association of Bridge and Structural Iron Workers, Pile Drivers and Ornamental Iron Workers, No. 109.
		Lathers—
89	Oakland	Wood, Wire and Metal Lathers International Union, No. 88.
90	Sacramento	Wood, Wire and Metal Lathers International Union, No. 109.
91	San Francisco	Wood, Wire and Metal Lathers International Union, No. 65.
92	San Jose	Wood, Wire and Metal Lathers International Union, No. 144.
93	San Rafael	Wood, Wire and Metal Lathers International Union, No. 268.
		Painters and Decorators—
94	Eureka	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 1034.
95	Fresno	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 294.
96	Los Gatos	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 271.
97	Marysville	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 146.
98	Merced	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 932.
99	Monterey	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 272.
100	Oakland	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 127.
101	Palo Alto	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 388.
102	Pasadena	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 92.

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Linemen, electric light	Male	Hour	56¼	8	44	80
Linemen, telephone	Male	Hour	50	8	48	
Inside wiremen	Male	Hour	56¼	8	44	
Linemen, electric light	Male	Day	4 50	8	48	81
Linemen, telephone	Male	Day	4 00	8	48	
Operators	Male	Month	100 00	8	48	
Inside wiremen	Male	Day	5 00	8	44	
Electrical workers	Male	Day	4 50	8	48	82
Elevator constructors	Male	Hour	62½	8	48	83
Elevator constructors, helpers	Male	Hour	37½	8	48	
House raisers and movers	Male	Day	4 50	8	44	84
Iron workers and pile drivers	Male	Hour	50	8	48	85
Structural iron workers	Male	Hour	62½	8	44	86
Iron workers and pile drivers	Male	Day	5 00	8	48	87
Iron workers and pile drivers	Male	Hour	62½	8	44	88
House movers	Male	Hour	50	8	44	
Metal lathers	Male	Day	6 00	8	44	89
Wood lathers	Male	Day	3 00	8	44	
Metal lathers	Male	Day	6 50	8	44	90
Wood lathers	Male	Day	3 75	8	44	
Lathers	Male	Day	6 00	8	44	91
Metal lathers	Male	Day	6 00	8	44	92
Wood lathers	Male	Day	3 50	8	44	
Metal lathers	Male	Day	6 00	8	44	93
Wood lathers	Male	Day	4 00	8	44	
Painters	Male	Day	4 00	8	48	94
Paperhangers	Male	Day	4 00	8	48	
Painters	Male	Day	4 50	8	44	95
Painters	Male	Day	4 50	8	44	96
Paperhangers	Male	Day	4 50	8	44	
Painters	Male	Day	4 50	8	44	97
Paperhangers	Male	Day	4 50	8	44	
Painters	Male	Day	4 00	8	48	98
Paperhangers	Male	Day	4 00	8	48	
Painters	Male	Day	4 50	8	48	99
Paperhangers	Male	Day	4 50	8	48	
Painters	Male	Day	[8]5 00	8	44	100
Painters	Male	Day	4 50	8	44	101
Paperhangers	Male	Day	4 50	8	44	
Painters	Male	Day	3 85	8	44	102
Paperhangers	Male	Day	4 00	8	44	

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[8] Increased, May, 1914, from $4.50 per day.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		I. Building, Stone Working, etc.—Continued.
		(b) BUILDING AND PAVING TRADES—Continued.
		Painters and Decorators—Continued.
103	Petaluma	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 293.
104	Richmond	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 560.
105	Riverside	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 780.
106	Sacramento	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 487.
107	San Diego	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 333.
108	San Francisco	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 510.
109	San Francisco	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 134.
110	San Jose	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 507.
111	San Mateo	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 913.
112	Santa Rosa	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 364.
113	Stockton	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 274.
114	Vallejo	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 376.
115	Visalia	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 899.
116	Watsonville	Brotherhood of Painters, Decorators, and Paperhangers of America, No. 750.
		Pavers and Rammermen—
117	San Francisco	International Union of Pavers and Rammermen, No. 26
		Plasterers—
118	Oakland	Operative Plasterers and Cement Finishers International Association, No. 112.
119	San Rafael	Operative Plasterers and Cement Finishers International Association, No. 355.
120	Stockton	Operative Plasterers and Cement Finishers International Association, No. 222.
		Plumbers, Gas and Steam Fitters—
121	Bakersfield	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 460.
122	Crockett	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 650.
123	Eureka	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 471.
124	Fresno	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 246.
125	Long Beach	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 494.

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Painters	Male	Day	3 50	8	44	103
Painters	Male	Day	4 50	8	44	104
Painters	Male	Day	3 50	8	48	105
Paperhangers	Male	Day	3 50	8	48	
Painters	Male	Day	5 00	8	44	106
Paperhangers	Male	Day	5 00	8	44	
Decorators	Male	Day	7 00	8	44	
Painters	Male	Day	4 00	8	44	107
Pictorial painters	Male	Day	6 50	8	44	108
Sign painters	Male	Day	5 50	8	44	
Helpers	Male	Day	4 00	8	44	
Polishers and varnishers—						109
(a) Inside	Male	Day	4 00	8	44–48	
(b) Outside	Male	Day	[9]5 00	8	44–48	
Painters	Male	Day	5 00	8	44	110
Painters	Male	Day	5 00	8	44	111
Paperhangers	Male	Day	5 00	8	44	
Sign writers	Male	Day	6 00	8	44	
Varnishers and polishers	Male	Day	5 00	8	44	
Painters	Male	Day	4 00	8	48	112
Painters	Male	Day	4 50	8	44	113
Paperhangers	Male	Day	4 50	8	44	
Painters	Male	Day	4 50	8	44	114
Painters	Male	Day	4 00	8	48	115
Painters	Male	Day	[10]4 50	8	48	116
Rammermen	Male	Day	5 00	8	48	117
Plasterers	Male	Day	7 00	8	44	118
Plasterers	Male	Day	7 00	8	44	119
Plasterers	Male	Day	7 00	8	44	120
Plumbers and fitters	Male	Day	6 00	8	44	121
Plumbers and fitters	Male	Day	4 00–4 80	8–10	48–60	122
Helpers	Male	Day	2 50–3 00	8–10	48–60	
Plumbers and fitters	Male	Day	4 00	8	48	123
Plumbers and fitters	Male	Day	5 50	8	44	124
Plumbers and fitters	Male	Day	5 00	8	44	125

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[9] January 1, 1915, wages increased from $4.50.
[10] January 1, 1916, wages increased from $4.00.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		I. Building, Stone Working, etc.—Continued.
		(b) BUILDING AND PAVING TRADES—Continued.
		Plumbers, Gas and Steam Fitters—Continued.
126	Los Angeles	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 78.
127	Modesto	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 25.
128	Monterey	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 62.
129	Pasadena	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 280.
130	Petaluma	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 478.
131	Redlands, and San Bernardino	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 364.
132	Richmond	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 310.
133	Richmond	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 436.
134	Sacramento	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 447.
135	San Jose	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 393.
136	San Mateo	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 467.
137	Santa Barbara	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 114.
138	Santa Cruz	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 365.
139	Stockton	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 492.
140	Vallejo	United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, No. 343.
		Roofers, Composition—
141	Los Angeles	International Brotherhood of Composition Roofers, Damp and Waterproof Workers of the United States and Canada, No. 21.
		Sheet Metal Workers—
142	Bakersfield	Amalgamated Sheet Metal Workers' International Alliance, No. 369.
143	Pasadena	Amalgamated Sheet Metal Workers' International Alliance, No. 293.
144	San Francisco	Amalgamated Sheet Metal Workers' International Alliance, No. 104.
145	San Mateo	Amalgamated Sheet Metal Workers' International Alliance, No. 272.

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Plumbers and fitters	Male	Day	4 50	8	48	126
Plumbers and fitters	Male	Day	4 50	8	48	127
Plumbers and fitters	Male	Day	5 00	8	44	128
Plumbers and fitters	Male	Day	5 00	8	44	129
Plumbers and fitters	Male	Day	3 50	8	48	130
Plumbers and fitters	Male	Day	4 50	8	48	131
Plumbers	Male	Day	5 50	8	44	132
Steam fitters	Male	Day	4 00	8	48	133
Helpers	Male	Day	3 00	8	48	
Plumbers and fitters	Male	Day	6 00	8	44	134
Helpers	Male	Day	3 00	8	44	
Plumbers and fitters	Male	Day	6 00	8	44	135
Plumbers and fitters	Male	Day	6 00	8	44	136
Helpers	Male	Day	2 00–3 00	8	44	
Plumbers and fitters	Male	Day	4 50	8	[11]44	137
Plumbers and fitters	Male	Day	5 00	8	44	138
Plumbers and fitters	Male	Day	[12]	-------	-------	139
Plumbers and fitters	Male	Day	[13]5 50	8	[13]44	140
Roofers	Male	Day	3 00	8	48	141
Sheet metal workers	Male	Day	5 50	8	44	142
Sheet metal workers	Male	Day	4 50	8	44	143
Sheet metal workers	Male	Day	5 50	8	44	144
Sheet metal workers	Male	Day	5 50	8	44	145

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[11] February, 1914, hours reduced from 48 per week.
[12] Information not given.
[13] September, 1915, wages increased from $5.00 per day, and hours reduced from 48 per week.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		I. Building, Stone Working, etc.—Continued.
		(b) BUILDING AND PAVING TRADES—Continued.
		Sheet Metal Workers—Continued.
146	Santa Cruz	Amalgamated Sheet Metal Workers' International Alliance, No. 304.
		Steam and Hot Water Fitters—
147	San Francisco	Gas Appliance and Stove Fitters, No. 12432
		Tilelayers—
148	Los Angeles	International Ceramic, Mosaic and Encaustic Tile Layers and Helpers' Union, No. 24.
149	San Francisco	International Ceramic, Mosaic and Encaustic Tile Layers and Helpers' Union, No. 48.
		(c) BUILDING AND STREET LABOR.
		Bricklayers, Masons and Plasterers' Laborers—
150	Marysville	International Hod Carriers and Building Laborers' Union of America, No. 121.
152	Redwood City	International Hod Carriers and Building Laborers' Union of America, No. 97.
153	Richmond	International Hod Carriers and Building Laborers' Union of America, No. 274.
154	San Diego	International Hod Carriers and Building Laborers' Union of America, No. 89.
155	San Mateo	International Hod Carriers and Building Laborers' Union of America, No. 160.
156	Stockton	International Hod Carriers and Building Laborers' Union of America, No. 73.
		General Building and Street Laborers—
157	Richmond	United Laborers' Union, No. 13085
158	San Francisco	United Laborers' Union, No. 1
159	San Jose	United Laborers' Union, No. 14190
160	San Rafael	United Laborers' Union, No. 11440
161	Vallejo	United Laborers' Union, No. 11345
		II. Transportation.
		(a) RAILWAYS.
		Street Railway Employees—
162	Oakland	Amalgamated Association of Street and Electric Railway Employees of America, No. 192.
163	Sacramento	Amalgamated Association of Street and Electric Railway Employees of America, No. 256.
164	San Francisco	Amalgamated Association of Street and Electric Railway Employees of America, No. 518.
165	San Jose	Amalgamated Association of Street and Electric Railway Employees of America, No. 265.
166	Stockton	Amalgamated Association of Street and Electric Railway Employees of America, No. 276.
		Trainmen, Road and Yard—
167	Los Angeles	Switchmen's Union of North America, No. 43
168	San Francisco	Brotherhood of Railroad Trainmen, No. 198

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Sheet metal workers	Male	Day	5 00	8	44	146
Fitters	Male	Day	4 00	8	48	147
Tilelayers	Male	Day	[14]4 50	8	48	
Tilelayers, helpers	Male	Day	[15]2 50	8	48	148
Tilelayers	Male	Day	6 00	8	44	149
Hod carriers	Male	Day	4 00–4 50	8	48	150
Laborers	Male	Day	3 00	8	48	
Hod carriers	----------	---------	[16]	-------	-------	152
Hod carriers	Male	Day	4 00	8	48	153
Hod carriers	Male	Day	[17]3 50	8	44	154
Cement mixers	Male	Day	4 00	8	44	155
Hod carriers	Male	Day	4 00	8	44	156
Laborers	Male	Day	2 50	8	48	157
Building laborers	Male	Day	3 00	8	48	158
Excavators	Male	Day	3 00	9	54	
Lath hoisters	Male	Day	3 50	8	48	
Street, sewer and park laborers	Male	Day	3 00	8	48	
Laborers	Male	Day	2 50	8	48	
Laborers	Male	Day	2 50	8	48	159
Building laborers	Male	Day	3 00	8	44	160
Cement laborers	Male	Day	4 00	8	44	
Laborers	Male	Day	3 00	8	48	
Laborers	Male	Day	Av. 3 50	8	48	161
Motormen and conductors	Male	Hour	30–42	10	60	162
Motormen and conductors	Male	Hour	29–32	9–10	66½	163
Motormen and conductors	Male	Day	3 00	8	-------	164
Motormen and conductors	Male	Hour	25–30	-------	-------	165
Motormen and conductors	Male	Hour	25–30	8–9¼	56–65	166
Interurban	Male	Hour	32	11	77	
Switchmen	Male	Hour	37	10	78	167
Switchmen	Male	Hour	37	10–11	70–77	168
Yard foremen	Male	Hour	40	10–11	70–77	
Yardmasters	Male	Month	140 00–145 00	11–13	77–91	

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[14] September, 1915, wages reduced from $5.00 per day.
[15] September, 1915, wages reduced from $2.75 per day.
[16] No information.
[17] July, 1914, wages reduced from $4.50 per day.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		II. Transportation—Continued.
		(b) NAVIGATION.
		Cooks and Stewards, Marine—
169	San Francisco	International Seamen's Union of America
		Engineers, Marine—
170	San Francisco	National Marine Engineers' Beneficial Association, No. 35.
		Firemen, Oilers, and Watertenders, Marine—
171	San Francisco	International Seamen's Union of America
		Seamen—
172	San Francisco	International Seamen's Union of America
173	San Francisco	Bay and River Steamboatmen's Union
		(c) TEAMING AND CAB DRIVING.
		Building Material Drivers—
174	Oakland	International Brotherhood of Teamsters, Chauffeurs, Stablemen, and Helpers, No. 577.
175	San Francisco	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 216.
176	San Mateo	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 160.
		Cabmen and Coach Drivers—
177	San Francisco	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 404.
178	San Francisco	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 265.
		Delivery Wagon Drivers—
179	San Francisco	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 278.
		Ice Handlers—
180	Oakland	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 610.
181	Sacramento	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 230.
182	Sacramento	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 230.
183	San Francisco	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 519.
		Laundry Wagon Drivers—
184	San Francisco	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 256.

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Cooks	Male	Month	[18]80 00	9–10	-------	169
Waiters	Male	Month	[19]35 00	9–10	-------	
Engineers, chief	Male	Month	130 00–200 00	9	54	170
Engineers, assistant	Male	Month	70 00–140 00	9	54	
Firemen, oilers, watertenders	Male	Month	55 00–65 00	9–12	-------	171
Seamen, coastwise steam	Male	Month	[20]55 00	9	54	172
Seamen, coastwise sail	Male	Month	[21]50 00	9	54	
Seamen, offshore steam	Male	Month	[22]55 00	9	54	
Seamen, offshore sail	Male	Month	[23]40 00	9	54	
Deckhands	Male	Month	50 00	11–12	66–72	173
Firemen	Male	Month	55 00	12	72	
Lumber teamsters	Male	Day	3 25–5 00	9	54	174
Brick, rock, etc. teamsters	Male	Day	3 00–5 00	9	54	
Team owners	Male	Day	6 00–10 00	9	54	
Automobile drivers	Male	Day	4 00–4 50	9	54	
Helpers on machines	Male	Day	3 00–3 50	9	54	
Teamsters	Male	Day	3 00	10	60	175
No information	----------	--------	---------------	-------	-------	176
Stablemen and hostlers	Male	Week	21 00	10	70	177
Chauffeurs	Male	Day	3 50	12	84	178
Washers	Male	Day	[24]3 50	9	63	
Brass polishers	Male	Day	[25]2 50	9	63	
Drivers, single	Male	Day	2 50	-------	-------	179
Drivers, double	Male	Day	3 00	-------	-------	
Drivers, automobile	Male	Day	3 50	-------	-------	
Drivers	Male	Month	90 00	12–14	70–75	180
Helpers	Male	Month	75 00	12–14	70–75	
Ice pullers	Male	Day	3 00	8	56	181
Retail drivers	Male	Day	3 00	10	60	
Wholesale drivers	Male	Day	3 75	10	60	
Auto truck drivers	Male	Day	4 00	10	60	182
Helpers	Male	Day	2 75	10	60	
Ice handlers	Male	Month	95 00	[26]10	60	183
Ice handlers, helpers	Male	Day	3 00	[26]10	60	
No information	----------	--------	---------------	-------	-------	184

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[16] No information.
[17] July, 1914, wages reduced from $4.50 per day.
[18] May, 1916, wages increased from $75.
[19] May, 1916, wages increased from $30.
[20] May, 1916, wages increased from $50.
[21] May, 1916, wages increased from $45.
[22] May, 1916, wages increased from $40-$45.
[23] May, 1916, wages increased from $30.
[24] 1914, wages increased from $3.00.
[25] 1911, wages increased from $2.00.
[26] March, 1916, hours reduced from eleven.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		II. Transportation—Continued.
		(c) TEAMING AND CAB DRIVING.
		Milk Wagon Drivers—
185	Oakland	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 302.
186	San Francisco	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 226.
		Team Drivers—
187	Fresno	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 431.
188	Los Angeles	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 208.
189	Los Gatos	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 374.
190	Oakland	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 70.
191	Petaluma	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 348.
192	Redwood City	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 469.
193	Richmond	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 420.
194	Sacramento	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 557.
195	San Francisco	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 85.
196	San Rafael	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 694.
197	Santa Rosa	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 417.
198	Stockton	International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers, No. 22.
		(d) FREIGHT HANDLING.
		Longshoremen—
199	Eureka	International Longshoremen's Association, No. 38-20
200	Redondo	International Longshoremen's Association, No. 38-40
201	San Diego	International Longshoremen's Association, No. 38-9
202	San Francisco	International Longshoremen's Association, No. 38-33
203	San Pedro	International Longshoremen's Association, No. 38-43
204	San Pedro	International Longshoremen's Association, No. 38-18
		Transfer Messengers—
205	San Francisco	Baggage Messengers and Transferers' Union, No. 10167
		III. Clothing and Textiles.
		(a) GARMENTS.
		Shirt and Overall Workers—
206	Los Angeles	United Garment Workers of America, No. 125
207	Napa	United Garment Workers of America, No. 137
208	Oakland	United Garment Workers of America, No. 131
209	San Francisco	United Garment Workers of America, No. 45

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Drivers	Male	Month	90 00	9	63	185
Drivers	Male	Month	90 00	9	63	186
Teamsters	Male	Day	3 00	9	54	187
Teamsters, one horse	Male	Day	2 25	12	72	188
Teamsters, two horse	Male	Day	2 25–2 50	12	72	
Truck drivers	Male	Day	2 75–3 50	12	72	
Helpers	Male	Hour	30	12	72	
Teamsters, two horse	Male	Day	3 00	9	-------	189
Teamsters, four horse	Male	Day	3 50	9	-------	
No information	-------	-------	-------	-------	-------	190
Teamsters	Male	Day	2 50	10	60	191
Teamsters, one horse	Male	Day	2 50	9	-------	192
Teamsters, two horse	Male	Day	3 00	9	-------	
Teamsters, four horse	Male	Day	3 50	9	-------	
No information	-------	-------	-------	-------	-------	193
Teamsters, one horse	Male	Week	15 00–18 00	10	60	194
Teamsters, two horse	Male	Week	18 00–20 00	10	60	
Teamsters, one horse	Male	Day	2 00–3 00	10	60	195
Teamsters, two horse	Male	Day	2 50–3 50	10	60	
Teamsters, four horse	Male	Day	3 50–4 00	10	60	
Teamsters, six horse	Male	Day	4 50	10	60	
Teamsters	Male	Day	-------	9	54	196
Teamsters	Male	Week	15 00	8–10	48–60	197
Teamsters	Male	Day	3 00–3 50	10	60	198
Longshoremen	Male	Hour	50	9	63	199
Longshoremen	Male	Hour	50	9	63	200
Longshoremen	Male	Hour	50	9	63	201
Longshoremen	Male	Hour	50	9	63	202
Longshoremen	Male	Hour	40	9	63	203
Longshoremen	Male	Hour	50	9	63	204
Baggage messengers	Male	Week	20 00	11	-------	205
Cutters	Male	Day	-------	8	48	206
Operators	Female	Day	-------	8	48	
Cutters	Male	Week	22 60	8	48	207
Garment workers	Female	Week	8 00	8	45½	
Garment workers	Female	Week	9 00	8	-------	208
Cutters	Male	Day	3 75	8¾	48	209

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		III. Clothing and Textiles—Continued.
		(a) GARMENTS—Continued.
		Tailors—
210	San Francisco	Journeymen Tailors' Union of America, No. 2
211	San Jose	Journeymen Tailors' Union of America, No. 108
		(b) LAUNDRY WORKERS.
		Laundry Workers—
212	Bakersfield	Laundry Workers' International Union, No. 175
213	Petaluma	Laundry Workers' International Union, No. 53
214	Sacramento	Laundry Workers' International Union, No. 75
215	San Jose	Laundry Workers' International Union, No. 33
216	Santa Rosa	Laundry Workers' International Union, No. 43
217	Vallejo	Laundry Workers' International Union, No. 113
		(c) HATS AND CAPS.
		Hat and Cap Workers—
218	San Francisco	United Hatters of North America, No. 23
		(d) BOOTS, SHOES AND GLOVES.
		Boot and Shoe Workers—
219	Oakland	Boot and Shoe Workers' Union, No. 324
220	Petaluma	Boot and Shoe Workers' Union, No. 335
		Glove Workers—
221	Napa	International Glove Workers' Union, No. 40
222	San Francisco	International Glove Workers' Union, No. 39
		IV. Metals, Machinery and Shipbuilding.
		(a) IRON AND STEEL.
		Architectural Iron Workers—
223	San Francisco	International Association of Bridge and Structural Iron Workers, No. 78.
		Blacksmiths—
224	Los Angeles	International Brotherhood of Blacksmiths and Helpers, No. 212.
225	Richmond	International Brotherhood of Blacksmiths and Helpers, No. 476.
226	Sacramento	International Brotherhood of Blacksmiths and Helpers, No. 174.
227	San Francisco	International Brotherhood of Blacksmiths and Helpers, No. 168.
228	Vallejo	International Brotherhood of Blacksmiths and Helpers, No. 82.
		Boilermakers—
229	Richmond	International Brotherhood of Boilermakers and Iron Ship Builders and Helpers of America, No. 317.
230	Sacramento	International Brotherhood of Boilermakers and Iron Ship Builders and Helpers of America, No. 94.

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Tailors	Male	Piece	12 00–25 00 Av. per wk.	8	48	210
Tailors	Male	Piece	15 00–21 00 Av. per wk.	9	56	211
Laundry workers	Male	Week	9 00–25 00	8	53	212
Laundry workers	Female	Week	8 00–10 00	8	47	
Laundry workers	Male	Week	15 00–25 00	9	54	213
Laundry workers	Female	Week	6 00–12 00	8	48	
Mangle hands	Female	Week	9 00	8	48	214
Washers and wringers	Male	Week	15 00	8	48	
Markers and distributors	M. & F.	Week	15 00 up	8	46–48	
Laundry workers	--------	--------	--------------	8	48	215
Washers	M. & F.	Week	15 00–18 00	8	48	216
Laundry workers	Female	Week	9 00–11 50	8	48	
Washers	Male	Week	18 00–20 00	8	48	217
Markers and distributors	Male	Week	18 00–20 00	8	48	
Laundry workers	M. & F	Week	8 00-15 00	8	48	
Curlers and finishers	Male	Piece	22 00 Av. per wk.	[27]8	44	218
Shoe repairers	Male	Day	2 50–3 00	9	54	219
Shoe repairers	Male	Day	--------------	5–8	-------	220
Cutters	Male	Day	3 00	9	51	221
Sewers	Female	Week	10 00–12 00	8	46	
Cutters	Male	Piece	Av.wk. 15 00	9	49½	222
Operators	Female	Piece	Av.wk. 12 00	8	44	
Outside mechanics	Male	Day	5 00	8	44	223
Shop mechanics	Male	Day	4 00	9	54	
Helpers	Male	Day	3 00	9	54	
Apprentices	Male	Day	1 00	9	54	
Blacksmiths	Male	Hour	50	8	48	224
Blacksmiths	Male	Day	4 00	8	48	225
Blacksmiths, helpers	Male	Day	3 30	8	48	
Blacksmiths	Male	Hour	43	9	54	226
Blacksmiths, helpers	Male	Hour	30	9	54	
Blacksmiths	Male	Hour	50	8	48	227
Blacksmiths, helpers	Male	Hour	37½	8	48	
Blacksmiths	Male	Day	3 00–4 25	8	48	228
Blacksmiths, helpers	Male	Day	2 65–3 00	8	48	
Boiler and tank workers	Male	Week	57 70	8	48	229
Helpers	Male	Week	44 00	8	48	
Boilermakers	Male	Hour	43	9	54	230

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[27] Hours reduced to eight per day.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		IV. Metals, Machinery and Shipbuilding—Continued.
		(a) IRON AND STEEL—Continued.
		Foundry Workers—
231	San Francisco	International Brotherhood of Foundry Employees, No. 8.
		Horseshoers—
232	Oakland	International Union of Journeymen Horseshoers of the United States and Canada, No. 45.
233	Sacramento	International Union of Journeymen Horseshoers of the United States and Canada, No. 47.
234	San Jose	International Union of Journeymen Horseshoers of the United States and Canada, No. 58.
		Machinists—
235	Fresno	International Association of Machinists, No. 653
236	Los Angeles	International Association of Machinists, No. 311
237	Oakland	International Association of Machinists, No. 284
238	Petaluma	International Association of Machinists, No. 575
239	Richmond	International Association of Machinists, No. 824
240	San Francisco	International Association of Machinists, No. 68
241	San Francisco	International Association of Machinists, No. 715
242	San Jose	International Association of Machinists, No. 504
243	Tiburon	International Association of Machinists, No. 238
244	Vallejo	International Association of Machinists, No. 252
		Molders and Coremakers—
245	Los Angeles	International Molders' Union of North America, No. 374
246	San Francisco	International Molders' Union of North America, No. 164
		Patternmakers—
247	Los Angeles	Patternmakers' League of North America
248	San Francisco	Patternmakers' League of North America
		Sheet Metal Workers—
249	S. San Francisco	Amalgamated Association of Iron, Steel and Tin Workers of North America, No. 5.
		(b) METALS, OTHER THAN IRON AND STEEL.
		Metal Polishers, Buffers, and Platers—
250	Los Angeles	Metal Polishers, Buffers, Platers, Brass Molders, and Brass and Silver Workers' Union of America, No. 67.
251	San Francisco	Metal Polishers, Buffers, Platers, Brass Molders, and Brass and Silver Workers' Union of America, No. 128.
		(c) SHIPBUILDING.
		Shipwrights, Joiners and Caulkers—
252	Oakland	United Brotherhood of Carpenters and Joiners of America, No. 875.
253	San Francisco	United Brotherhood of Carpenters and Joiners of America, No. 759.
254	San Francisco	California Shipwrights and Caulkers
255	San Francisco	United Brotherhood of Carpenters and Joiners of America, No. 449.
256	San Francisco	United Brotherhood of Carpenters and Joiners of America, No. 554.
257	Stockton	United Brotherhood of Carpenters and Joiners of America, No. 732.

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Casting cleaners	Male	Day	3 00	8	48	231
Horseshoers	Male	Day	4 00	9	53	232
Horseshoers	Male	Week	27 00	8	53	233
Horseshoers	Male	Week	21 00	8	48	234
Machinists	Male	Hour	40–50	9	54	235
Machinists	Male	Hour	35–55	8–9	48–54	236
Machinists	Male	Hour	43–50	8	48	237
Machinists	Male	Hour	50	8	48	238
Machinists	Male	Hour	50	8	48	239
Machinists	Male	Hour	50	8	48	240
Machinists	Male	Day	3 00–4 00	8	48	241
Machinists	Male	Day	4 00	8	48	242
Machinists	Male	Hour	43	9	54	243
Machinists	Male	Day	3 00–4 25	8	48	244
Molders and coremakers	Male	Hour	37½	9	54	245
Molders and coremakers	Male	Day	4 00	8	48	246
Patternmakers	Male	Hour	45–53	8–9	48–54	247
Patternmakers	Male	Day	5 00	8	48	248
Steel workers	Male	Ton.	30 00–60 00 Av. per wk.	10	57	249
Polishers	Male	Day	3 50–4 00	8	48	250
Buffers	Male	Day	3 50–4 00	8	48	
Platers	Male	Day	3 50–4 00	8	48	
Platers	Male	Day	3 50	9	54	251
Shipwrights	Male	Day	4 00–5 00	8	48	252
Shipwrights	Male	Day	5 00	8	48	253
Shipwrights	Male	Day	4 50–5 00	8	48	254
Caulkers	Male	Day	5 00	8	48	255
Ship joiners	Male	Day	5 00	8	48	
Caulkers	Male	Day	5 00	8	48	256
Shipwrights	Male	Day	4 00	8	48	257
Joiners	Male	Day	4 00	8	48	

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		V. Printing, Binding, etc.
		Bookbinders—
258	Los Angeles	International Brotherhood of Bookbinders, No. 63
259	Sacramento	International Brotherhood of Bookbinders, No. 35
260	San Francisco	International Brotherhood of Bookbinders, No. 31
261	San Francisco	International Brotherhood of Bookbinders, No. 125
		Compositors—
262	Bakersfield	International Typographical Union, No. 439
263	El Centro	International Typographical Union, No. 707
264	Eureka	International Typographical Union, No. 207
265	Fresno	International Typographical Union, No. 144
266	Los Angeles	International Typographical Union, No. 174
267	Richmond and Martinez	International Typographical Union, No. 597
268	Modesto and Turlock	International Typographical Union, No. 689
269	Oakland	International Typographical Union, No. 36
270	Palo Alto	International Typographical Union, No. 521
271	Pasadena	International Typographical Union, No. 583
272	Petaluma	International Typographical Union, No. 600
273	Riverside	International Typographical Union, No. 254
274	Sacramento	International Typographical Union, No. 46
275	San Diego	International Typographical Union, No. 221

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Bookbinders	Male	Week	19 50	8	48	258
Bookbinders	Female	Week	9 00	8	48	
Bookbinders	Male	Week	24 00–27 00	8	48	259
Bookbinders	Male	Day	4 00	8	48	260
Journeywomen	Female	Week	10 00	8	48	261
Day work—						262
(a) Foremen	Male	Week	[28]31 50	8	48	
(b) Journeymen, newspapers	Male	Week	[28]28 50	8	48	
(c) Journeymen, job	Male	Week	[28]25 50	8	48	
Night work—						
(a) Foremen	Male	Week	[28]33 00	8	48	
(b) Journeymen, newspapers	Male	Week	[28]30 00	8	48	
(c) Journeymen, job	Male	Week	[28]30 00	8	48	
Day work—						263
(a) Floor work	Male	Day	3 75	8	48	
(b) Machine work	Male	Day	4 50	8	48	
Night work—						
(a) Floor work	Male	Day	4 25	7½	45	
(b) Machine work	Male	Day	5 00	7½	45	
Day—compositors	Male	Week	18 00	8	48	264
Night—compositors	Male	Week	21 00	8	48	
Day—journeymen	M. & F.	Day	4 50	7½	45	265
Night—journeymen	M. & F.	Day	5 00	7½	45	
Journeymen, newspapers—						266
(a) Day work	Male	Week	29 00	8	48	
(b) Night work	Male	Week	32 00	8	48	
Job work—						
(a) Day work	Male	Week	24 00	8	48	
(b) Night work	Male	Week	27 00	8	48	
Printers	Male	Week	21 00–24 00	8	48	267
Journeymen	Male	Day	3 50–4 00	8	48	268
Job men	Male	Day	3 50	8	48	
Journeymen, newspapers	M. & F.	Day	4 83–5 33	7½	45	269
Journeymen, job	M. & F.	Day	4 50	8	48	
Compositors	Male	Week	18 00–27 00	8	48	270
Day work—						271
(a) Foremen, newspapers	Male	Day	5 16⅔	8	48	
(b) Foremen, job	Male	Week	25 00–26 00	8	48	
(c) Journeymen, newspapers	Male	Day	3 66⅔	8	48	
(d) Journeymen, job	Male	Day	3 83⅓	8	48	
Night work—						
(a) Foremen, newspapers	Male	Day	5 66⅔	8	48	
(b) Foremen, job	Male	Week	25 00	8	48	
(c) Journeymen, newspapers	Male	Day	4 66⅔	8	48	
(d) Journeymen, job	Male	Day	4 16⅔	8	48	
Day work—						272
(a) Foremen, newspapers	Male	Week	21 00	8	48	
(b) Foremen, job	Male	Week	21 00	8	48	
(c) Journeymen	Male	Week	18 00	8	48	
Night work—						
(a) Foremen, newspapers	Male	Week	21 00	8	48	
(b) Journeymen	Male	Week	27 00	8	48	
Compositors	M. & F.	Week	24 00–30 00	8	48	273
Journeymen, newspapers	Male	Day	4 75–5 25	8	48	274
Job men	Male	Day	4 00	8	48	275
Journeymen, newspapers—						
(a) Day	Male	Day	4 50	8	48	
(b) Night	Male	Day	5 00	8	48	

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[28] Wages advanced twenty-five cents per day.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		V. Printing, Binding, Etc.—Continued.
		Compositors—Continued.
276	San Francisco	International Typographical Union, No. 21
277	San Jose	International Typographical Union, No. 231
278	San Luis Obispo	International Typographical Union, No. 576
279	San Mateo	International Typographical Union, No. 624
280	San Rafael	International Typographical Union, No. 729
281	Santa Barbara	International Typographical Union, No. 394
282	Santa Cruz	International Typographical Union, No. 589
283	Santa Rosa	International Typographical Union, No. 577
284	Stockton	International Typographical Union, No. 56
285	Vallejo	International Typographical Union, No. 389
		Electrotypers and Stereotypers—
286	Fresno	International Stereotypers and Electrotypers' Union of North America, No. 104.
287	Los Angeles	International Stereotypers and Electrotypers' Union of North America, No. 58.
288	Sacramento	International Stereotypers and Electrotypers' Union of North America, No. 86.
289	San Francisco	International Stereotypers and Electrotypers' Union of North America, No. 29.
290	San Jose	International Stereotypers and Electrotypers' Union of North America, No. 120.
		Lithographers—
291	Los Angeles	Amalgamated Lithographers of America, No. 22
		Mailers—
292	San Francisco	International Typographical Union, No. 18
		Photo Engravers—
293	Los Angeles	International Photo Engravers' Union of North America, No. 32.
294	San Francisco	International Photo Engravers' Union of North America, No. 8.
		Pressmen—
295	Bakersfield	International Printing Pressmen and Assistants' Union of North America, No. 264.
296	Fresno	International Printing Pressmen and Assistants' Union of North America, No. 159.
297	Los Angeles	International Printing Pressmen and Assistants' Union of North America, No. 18.
298	Los Angeles	International Printing Pressmen and Assistants' Union of North America, No. 37.
299	Oakland	International Printing Pressmen and Assistants' Union of North America, No. 125.
300	Sacramento	International Printing Pressmen and Assistants' Union of North America, No. 60.
301	San Diego	International Printing Pressmen and Assistants' Union of North America, No. 140.
302	San Francisco	International Printing Pressmen and Assistants' Union of North America, No. 4.

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Job men	M. & F.	Week	25 00	7	42	276
Journeymen, newspapers—						
(a) Day	M. & F.	Week	29 00	7	42	
(b) Night	M. & F.	Week	32 00	7	42	
Job men	Male	Day	3 75	8	48	277
Journeymen, newspapers—						
(a) Day	M. & F.	Day	4 25	7½	45	
(b) Night	M. & F.	Day	4 75	7½	45	
Journeymen	M. & F.	Day	2 50	8	48	278
Journeymen	M. & F.	Week	18 00–24 00	8	48	279
Journeymen	Male	Day	4 20–5 33	8	48	280
Journeymen	Male	Week	21 00	8	48	281
Journeymen—day	Male	Week	24 00	8	48	282
Journeymen—night	Male	Week	27 00	8	48	
Job men	Male	Day	3 00	8	48	283
Journeymen, newspapers—						
(a) Day	Male	Day	4 00	8	48	
(b) Night	Male	Day	4 50	8	48	
Job men	Male	Week	25 50	8	48	284
Job men	Male	Week	15 00	8	48	285
Stereotypers	Male	Day	4 50	8	48	286
Stereotypers	Male	Day	4 50	8	48	287
Stereotypers	Male	Day	4 25	8	48	288
Electrotypers	Male	Week	36 00	8	48	
Foremen	Male	Day	6 33⅓	8	48	289
Journeymen	Male	Day	5 00	8	48	
Apprentices	Male	Day	2 50–4 00	8	48	
Foremen	Male	Day	5 50	8	48	290
Journeymen	Male	Day	4 50	8	48	
Apprentices	Male	Day	2 00–3 50	8	48	
Lithographers	Male	Week	24 00–28 00	8	48	291
Mailers	Male	Day	4 00	8	48	292
Photo engravers—						
(a) Day	Male	Week	24 00	8	48	
(b) Night	Male	Week	27 00	8	48	
Photo engravers—						294
(a) Day	Male	Week	26 00	8	48	
(b) Night	Male	Week	29 00	8	48	
Pressmen	Male	Day	4 00–5 00	8	48	295
Press feeders	Male	Day	2 50–3 00	8	48	
Pressmen	Male	Day	4 00–4 75	8	48	296
Pressmen	Male	Day	4 33	8	48	297
Apprentices	Male	Day	2 50	8	48	
Press feeders	Male	Week	14 00–17 00	8	48	298
Pressmen	Male	Day	4 50	8	48	299
Press feeders	Male	Day	2 25–2 75	8	48	
Pressmen	Male	Day	3 50–4 50	8	48	300
Pressmen	Male	Hour	37½–50	8	48	301
Press feeders	Male	Hour	25–30	8	48	
Apprentices	Male	Hour	31¼	8	48	
Pressmen, web	Male	Day	5 16	8	48	302
Pressmen, apprentices	Male	Day	2 50	8	48	

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		V. Printing, Binding, Etc.—Continued.
		Pressmen—Continued.
303	San Francisco	International Printing Pressmen and Assistants' Union of North America, No. 24.
304	San Jose	International Printing Pressmen and Assistants' Union of North America, No. 146.
305	Stockton	International Printing Pressmen and Assistants' Union of North America, No. 132.
		VI. Woodworking and Furniture.
		Boxmakers and Sawyers—
306	Oakland	United Brotherhood of Carpenters and Joiners of America, No. 1187.
		Broommakers—
307	Los Angeles	International Broom and Whisk Makers' Union, No. 28
		Carriage and Wagon Workers—
308	San Francisco	Carriage and Automobile Painters, No. 1073
		Coopers—
309	Los Angeles	Coopers' International Union of North America, No. 152
		Mill Workers—
310	Fresno	United Brotherhood of Carpenters and Joiners of America, No. 1496.
311	San Francisco	United Brotherhood of Carpenters and Joiners of America, No. 42.
312	San Jose	United Brotherhood of Carpenters and Joiners of America, No. 262.
313	San Mateo	United Brotherhood of Carpenters and Joiners of America, No. 162.
		Upholsterers—
314	San Francisco	Upholsterers and Trimmers' International Union of North America, No. 28.
315	San Jose	Upholsterers and Trimmers' International Union of America, No. 2.
		Wood Carvers—
316	San Francisco	International Wood Carvers' Association of North America.
		VII. Food and Liquors.
		(a) Food Products.
		Bakers and Confectioners—
317	Fresno	Bakery and Confectionery Workers' International Union of North America, No. 43.
318	Los Angeles	Bakery and Confectionery Workers' International Union of North America, No. 37.
319	Sacramento	Bakery and Confectionery Workers' International Union of North America, No. 85.
320	San Diego	Bakery and Confectionery Workers' International Union of North America, No. 90.
321	San Francisco	Bakery and Confectionery Workers' International Union of North America, No. 24.

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Pressmen	Male	Day	4 00–4 75	8	48	303
Pressmen, apprentices	Male	Week	17 00–22 00	8	48	
Pressmen	Male	Day	3 50–5 00	8	48	304
Apprentices	Male	Day	1 65–3 00	8	48	
Pressmen	Male	Day	3 50–5 00	8	48	305
Box makers	Male	Day	2 75	9	54	306
Sawyers	Male	Day	2 75–3 35	9	54	
Broom makers	Male	Week	[29]18 00	9	50	307
Stripers	Male	Day	5 00	8	48	308
Bodymen	Male	Day	3 50	8	48	
Coopers, beer barrels	Male	Week	24 00	8	48	309
Coopers, wine & whiskey bbls.	Male	Week	21 00	8	48	
Coopers, slack barrels	Male	Piece	Av.wk. 30 00	8	48	
Stickermen	Male	Day	4 00	8	48	310
Bench hands	Male	Day	4 00	8	48	
Mill hands	Male	Day	3 50	8	48	
Stickermen	Male	Day	5 00	8	48	311
Bench hands	Male	Day	4 50	8	48	
Mill hands	Male	Day	3 25–4 00	8	48	
Stickermen	Male	Day	5 00	8	48	312
Bench hands	Male	Day	4 50	8	48	
Mill hands	Male	Day	3 25–4 00	8	48	
Millmen	Male	Day	5 00	8	48	313
Upholsterers	Male	Day	4 50	8	44	314
Mattress workers	Male	Day	4 00	8	44	
Upholsterers	Male	Day	[30]4 00	8	48	315
Wood carvers	Male	Day	5 00	8	44	316
Foremen	Male	Week	25 00	9	55	317
Bench hands	Male	Week	21 00	9	55	
Foremen	Male	Week	21 00–26 00	9	54	318
Bench hands	Male	Week	18 00–21 00	9	54	
Journeymen	Male	Week	22 00–27 00	9	56	319
Helpers	Male	Week	12 00–18 00	9	56	
Salesmen	Male	Week	18 00	9	56	
Foremen	Male	Week	22 00–25 00	[31]9	[31]54	320
Bench hands	Male	Week	18 00–22 00	[31]9	[31]54	
Foremen	Male	Week	25 00	8–9	48–54	321
Bench hands	Male	Week	20 00–21 00	8–9	48–54	
Helpers	Male	Week	9 00–14 00	8–9	48–54	

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[29] January, 1915, wages increased from $15.00.
[30] April, 1914, wages increased from $3.50 per day.
[31] May, 1915, hours reduced from ten per day.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		VII. Food and Liquors—Continued.
		(a) FOOD PRODUCTS—Continued.
		Bakers and Confectioners—Continued
322	San Francisco	Bakery and Confectionery Workers' International Union of North America, No. 125 (annex).
		Butchers and Meat Cutters—
323	Oakland	Amalgamated Meat Cutters and Butcher Workmen of North America, No. 120.
324	Sacramento	Amalgamated Meat Cutters and Butcher Workmen of North America, No. 498.
325	San Francisco	Amalgamated Meat Cutters and Butcher Workmen of North America, No. 115.
326	San Francisco	Amalgamated Meat Cutters and Butcher Workmen of North America, No. 508.
327	San Mateo	Amalgamated Meat Cutters and Butcher Workmen of North America, No. 516.
328	Stockton	American Federation of Labor, Butchers' Union, No. 127
329	Vallejo	Amalgamated Meat Cutters and Butcher Workmen of North America, No. 532.
		(b) BEVERAGES.
		Brewery Employees, Beer Drivers and Bottlers—
330	Eureka	International Union of United Brewery Workmen of America.
331	Los Angeles	International Union of United Brewery Workmen of America, No. 227 (Branch 6).
332	Sacramento	International Union of United Brewery Workmen of America, No. 227 (Branch 4).
333	San Diego	International Union of United Brewery Workmen of America, No. 7 (Branch 3).
334	San Francisco	International Union of United Brewery Workmen of America, No. 293.
335	San Francisco	International Union of United Brewery Workmen of America, No. 227.
336	San Jose	International Union of United Brewery Workmen of America, No. 7 (Branch 2).
		Brewery Employees, Brewers and Maltsters—
337	Los Angeles	International Union of United Brewery Workmen of America, No. 7 (Branch 4).
338	Sacramento	International Union of United Brewery Workmen of America, No. 7 (Branch 6).
339	San Francisco	International Union of United Brewery Workmen of America, No. 7.
		VIII. Theaters and Music.
		Moving Picture and Projecting Machine Operators—
340	Fresno	International Alliance of Theatrical Stage Employees, and Motion Picture Machine Operators, No. 599.

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Cracker and cake packers	Female	Week	9 00–10 50	8	48	322
Icing workers	Female	Week	9 00	8	48	
Meat cutters	Male	Day	[32]3 50	9–10	[32]57–61	323
Sausage makers	Male	Day	[32]3 50	9–10	[32]57–61	
Butchers	Male	Week	[33]21 00	[33]10	61	324
Meat cutters	Male	Week	[34]22 00	10	61	325
Butchers	Male	Month	100 00–150 00	8	45	326
	----------	----------	----------	10½–11½	52½–64	327
Butchers	Male	Week	21 00	10	61½	328
Meat cutters	Male	Week	20 00	10½	67½	329
Beer drivers	Male	Week	19 00–25 00	10	60	330
Bottlers	Male	Week	18 00	8	48	
Brewers	Male	Week	24 00	8	48	
Beer drivers	Male	Week	23 00–24 00	9	54	331
Stablemen	Male	Week	21 00	9	58	
Helpers	Male	Week	19 00	9	51	
Beer drivers	Male	Day	4 10	10	60	332
Engineers	Male	Week	27 00	8	56	333
Bottlers	Male	Week	20 50	8	48	
Drivers	Male	Week	23 00–26 00	9	54	
Helpers	Male	Week	21 00	9	54	
Brewers	Male	Week	25 50	8	48	
Beer bottlers	Male	Day	3 75	8	48	334
Drivers, keg	Male	Week	28 00	9	54	335
Drivers, bottle	Male	Week	23 00	9	54	
Drivers, shipping	Male	Week	24 00	9	54	
Helpers	Male	Week	24 00	9	54	
Stablemen	Male	Week	24 00	10	60	
Brewers	Male	Week	25 50	8	48	336
Drivers, keg	Male	Week	28 00	11	66	
Drivers, bottle	Male	Week	23 00	11	66	
Bottlers	Male	Week	22 50	8	48	
Brewers and maltsters	Male	Week	25 50	8	48	337
Brewers and maltsters	Male	Day	4 25	8	48	338
Brewers and maltsters	Male	Day	4 25	8	48	339
Operators	Male	Week	30 00	13	91	340

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[32] January, 1914, wages increased $1.00 per week; hours reduced from 63 per week.
[33] April, 1914, wages increased from $3.00 per day, and hours reduced from 12-14 per day.
[34] August, 1914, wages increased $1.00 per week.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		VIII. Theaters and Music—Continued.
		Moving Picture—
341	Los Angeles	International Alliance of Theatrical Stage Employees, and Moving Picture Operators of the United States, No. 150.
342	Oakland	International Alliance of Theatrical Stage Employees, and Moving Picture Operators of the United States, No. 169.
343	Sacramento	International Alliance of Theatrical Stage Employees, and Moving Picture Operators of the United States, No. 252.
344	San Francisco	International Alliance of Theatrical Stage Employees, and Moving Picture Operators of the United States, No. 162.
345	San Jose	International Alliance of Theatrical Stage Employees, and Moving Picture Operators of the United States, No. 431.
346	Stockton	International Alliance of Theatrical Stage Employees, and Moving Picture Operators of the United States, No. 428.
		Musicians—
347	Chico	American Federation of Musicians, No. 508
348	Fresno	American Federation of Musiicans, No. 210
349	Healdsburg	American Federation of Musicians, No. 577
350	Long Beach	American Federation of Musicians, No. 353
351	Los Angeles	American Federation of Musicians, No. 47
352	Marysville	American Federation of Musicians, No. 158
353	Napa	American Federation of Musicians, No. 377
354	Petaluma	American Federation of Musicians, No. 439
355	Redwood City	American Federation of Musicians, No. 570
356	Richmond	American Federation of Musicians, No. 424
357	Riverside	American Federation of Musicians, No. 692
358	Sacramento	American Federation of Musicians, No. 12
359	San Bernardino	American Federation of Musicians, No. 167
360	San Diego	American Federation of Musicians, No. 325
361	San Jose	American Federation of Musicians, No. 153
362	San Francisco	American Federation of Musicians, No. 6
363	Santa Barbara	American Federation of Musicians, No. 308
364	Santa Cruz	American Federation of Musicians, No. 346
365	Santa Rosa	American Federation of Musicians, No. 292
366	Stockton	American Federation of Musicians, No. 189
367	Vallejo	American Federation of Musicians, No. 367
		Stage Mechanics—
368	Eureka	International Alliance of Theatrical Stage Employees, No. 430.
369	Fresno	International Alliance of Theatrical Stage Employees, No. 158.
370	Marysville	International Alliance of Theatrical Stage Employees, No. 216.
371	Oakland	International Alliance of Theatrical Stage Employees, No. 107.
372	Sacramento	International Alliance of Theatrical Stage Employees, No. 50.
373	San Diego	International Alliance of Theatrical Stage Employees, No. 122.
374	San Francisco	International Alliance of Theatrical Stage Employees, No. 16.
375	Stockton	International Alliance of Theatrical Stage Employees, No. 90.

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Operators	Male	Week	25 00	-------	-------	341
Operators	Male	Hour	60	8	56	342
Operators	Male	Week	25 00-30 00	6½	-------	343
Operators	Male	Week	27 50-32 50	-------	-------	344
Operators	Male	Week	[35]25 00	8	56	345
Operators	Male	Week	25 00	8	56	346
Musicians	§	§	§	§	§	347
Musicians	§	§	§	§	§	348
Musicians	§	§	§	§	§	349
Musicians	§	§	§	§	§	350
Musicians	§	§	§	§	§	351
Musicians	§	§	§	§	§	352
Musicians	§	§	§	§	§	353
Musicians	§	§	§	§	§	354
Musicians	§	§	§	§	§	355
Musicians	Female	§	22 50	§	§	356
Musicians	Male	§	22 50-25 00	§	§	
Musicians	§	§	§	§	§	357
Musicians	§	§	§	§	§	358
Musicians	§	§	§	§	§	359
Musicians	§	§	§	§	§	360
Musicians	§	§	§	§	§	361
Musicians	§	§	§	§	§	362
Musicians	§	§	§	§	§	363
Musicians	§	§	§	§	§	364
Musicians	§	§	§	§	§	365
Musicians	§	§	§	§	§	366
Musicians	§	§	§	§	§	367
Mechanics, property men, etc.	Male	---------	--------------	-------	-------	368
Mechanics, property men, etc.	Male	Hour	60	8	56	369
Mechanics, property men, etc.	----------	---------	--------------	-------	-------	370
Mechanics, property men, etc.	Male	Week	30 00-35 00	-------	53-56	371
Mechanics, property men, etc.	Male	Week	25 00-30 00	8	56	372
Mechanics, property men, etc.	Male	Week	27 00	5-7	35-49	373
Mechanics, property men, etc.	Male	Week	20 00-35 00	8	56	374
Mechanics, property men, etc.	Male	Week	20 00-30 00	-------	-------	375

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[35] September, 1914, wages increased from $20.00 per week.

§Musicians in most instances are engaged in another occupation through which they gain a livelihood, many being members in unions in other trades. The wage varies with the nature of the service rendered, and the purpose for which it is rendered.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		IX. Tobacco.
		Cigar Makers—
376	Bakersfield	Cigar Makers' International Union of America, No. 469
377	Los Angeles	Cigar Makers' International Union of America, No. 225
378	Sacramento	Cigar Makers' International Union of America, No. 238
379	San Diego	Cigar Makers' International Union of America, No. 332
380	San Francisco	Cigar Makers' International Union of America, No. 228
381	San Jose	Cigar Makers' International Union of America, No. 291
		Tobacco Workers—
382	San Francisco	Tobacco Workers' International Union, No. 74
		X. Restaurants and Trade.
		(a) HOTELS AND RESTAURANTS.
		Bartenders—
383	Bakersfield	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 378.
384	Eureka	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 406.
385	Fresno	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 566.
386	Los Angeles	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 284.
387	Marysville	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 699.
388	Mojave	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 448.
389	Oakland	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 525.
390	Richmond	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 595.
391	Sacramento	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 603.
392	San Diego	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 768.
393	San Francisco	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 41.
394	San Jose	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 577.
395	San Pedro	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 591.
396	San Rafael	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 542.
397	Santa Rosa	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 770.
398	Stockton	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 403.

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Cigar makers	Male	Week	18 00	8	48	376
Cigar makers	Male	Piece	----	8	47	377
Cigar makers	Male	Piece	----	8	48	378
Cigar makers	M. & F.	Piece	Av.wk. 15 00	8	48	379
Cigar packers	Male	Piece	Av.wk. 20 00	8	48	
Cigar makers	Male	Piece	----	8	48	380
Cigar makers	Male	Piece	Av.wk. 14 00	8	48	381
Labelers	Female	Week	7 00	8	48	382
Packers	Male	Week	12 00-20 00	8	48	
Bartenders	Male	Day	3 50	8	56	383
Bartenders	Male	Week	21 00	9	63	384
Bartenders	Male	Week	21 00	9	54	385
Bartenders	Male	Day	3 75	10	60	386
Bartenders	Male	Week	21 00	10	70	387
Bartenders	Male	Hour	40	9	63	388
Bartenders	Male	Day	3 50	10	60	389
Bartenders	Male	Day	3 50	10	60	390
Bartenders	Male	Week	21 00	[36]10	60	391
Bartenders	Male	Week	22 50	9½	[37]57	392
Bartenders	Male	Week	21 00	10	60	393
Bartenders	Male	Month	75 00-125 00	9	54-63	394
Bartenders	Male	Week	22 50	9	54	395
Bartenders	Male	Week	17 50	9	63	396
Bartenders	Male	----	----	9	[37]54	397
Bartenders	Male	Week	21 00	10	[38]60	398

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[36] January, 1914, hours reduced from 12 per day. January, 1915, hours reduced from 60 and over.
[37] July, 1914, hours reduced from 63 per week
[38] June, 1914, hours reduced from 70 per week.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		X. Restaurants and Trade—Continued.
		(a) HOTELS AND RESTAURANTS—Continued.
		Cooks, Waiters, and Waitresses—
399	Bakersfield	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 550.
400	Fresno	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 62.
401	Los Angeles	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 370.
402	Oakland	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 31.
403	Sacramento	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 561.
404	San Bernardino	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 673.
405	San Diego	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 402.
406	San Francisco	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 110.
407	San Francisco	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 44.
408	San Francisco	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 30.
409	San Francisco	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 48.
410	San Jose	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 180.
411	San Pedro	Hotel and Restaurant Employees' International Alliance and Bartenders' International League of America, No. 754.
		(b) BARBERING.
		Barbers—
412	Bakersfield	Journeymen Barbers' International Union, No. 317
413	El Centro	Journeymen Barbers' International Union, No. 733
414	Eureka	Journeymen Barbers' International Union, No. 431
415	Jackson	Journeymen Barbers' International Union, No. 533
416	Los Angeles	Journeymen Barbers' International Union, No. 295
417	Modesto	Journeymen Barbers' International Union, No. 24
418	Oakland	Journeymen Barbers' International Union, No. 134
419	Petaluma	Journeymen Barbers' International Union, No. 419
420	Richmond	Journeymen Barbers' International Union, No. 508
421	San Bernardino	Journeymen Barbers' International Union, No. 253
422	San Diego	Journeymen Barbers' International Union, No. 256

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Waiters	Male	Day	2 50–3 00	10	70	399
Waitresses	Female	Month	45 00	6¾	48	
Cooks	Male	Day	3 00–3 50	10	60	400
Waiters	Male	Day	2 00–2 50	10	60	
Helpers	Male	Day	2 50	12	84	
Waitresses	Female	Week	8 00	8	48	
Waiters	Male	Week	8 00–10 00	10–12	70–84	401
Waitresses	Female	Week	6 00–8 00	8	48	
Cooks	Male	Week	18 00–27 00	10	60	402
Cooks	Female	Week	14 50–18 00	8	48	
Waitresses	Female	Week	6 00–9 00	6–8	36–48	
Waiters	Male	Week	10 00–12 00	10	60	
Dishwashers	Male	Week	9 00	10	60	
Cooks	Male	Week	18 00	10	60	403
Waiters	Male	Week	12 00	10	60	
Waitresses	Female	Week	9 00	8	48	
Cooks	Male	Week	20 00–24 00	10	70	404
Waiters	Male	Week	14 00	8	48	
Waitresses	Female	Week	9 00	[39]8	48	
Cooks	Male	Week	21 00–25 00	10	70	405
Helpers	Male	Week	12 60	10	70	
Waiters	Male	Day	1 25–2 00	10	60	
Waitresses	Female	Week	6 00–9 00	8	48	
Cooks, helpers	Male	Week	12 00	10	60	406
Helpers	Male	Week	10 00	10	60	
Cooks	Male	Day	3 00	10	60	407
Waiters	Male	Day	2 00	10	60	408
Waitresses	Female	Week	[40]10 00	8	48	409
Cooks	Male	Week	18 00	10	-------	410
Cooks	Male	Week	15 00	11	66	411
Waiters	Male	Week	12 00	10	60	
Waitresses	Female	Week	9 00	8	48	
Barbers	Male	Week	20 00	11½	72	412
Barbers	Male	Day	3 00	12	75	413
Barbers	Male	Week	18 00	10	62	414
Barbers	----------	--------	---------------	-------	-------	415
Barbers	Male	Week	15 00	10½	66	416
Barbers	Male	Week	18 00	9½	70	417
Barbers	Male	Week	16 00	8–10	77½	418
Barbers	Male	Week	[41]18 00	10	66	419
Barbers	Male	Week	18 00	9½	61½	420
Barbers	Male	Week	[42]15 00	12	65	421
Barbers	Male	Week	15 00	10	67½	422

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[39] January, 1916, hours reduced from 14 per day.
[40] 1914, wages increased from $9.00 per week.
[41] Plus 60 per cent over $28.00 taken in.
[42] Plus 60 per cent over $23.50 taken in.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		X. Restaurants and Trade—Continued.
		(b) BARBERING—Continued.
		Barbers—Continued.
423	San Francisco	Journeymen Barbers' International Union, No. 148
424	San Jose	Journeymen Barbers' International Union, No. 252
425	Santa Ana	Journeymen Barbers' International Union, No. 388
426	Santa Barbara	Journeymen Barbers' International Union, No. 560
427	Santa Rosa	Journeymen Barbers' International Union, No. 159
428	Stockton	Journeymen Barbers' International Union, No. 312
429	Vallejo	Journeymen Barbers' International Union, No. 335
		(c) RETAIL TRADE.
		Clerks and Salesmen—
430	Bakersfield	Retail Clerks' International Protective Association, No. 1217.
431	Oakland	Bakery and Confectionery Workers' International Union of America, No. 102.
432	San Diego	Retail Clerks' International Protective Association, No. 769.
433	San Francisco	Retail Clerks' International Protective Association, No. 432.
434	San Jose	Retail Clerks' International Protective Association, No. 428.
		Office Employees—
435	San Francisco	Office Employees' Association, No. 13188
		XI. Public Employment.
		Post Office Clerks—
436	Berkeley	National Federation of Post Office Clerks, No. 47
437	Los Angeles	National Federation of Post Office Clerks, No. 64
438	San Jose	National Federation of Post Office Clerks, No. 73
439	Sacramento	National Federation of Post Office Clerks, No. 66
440	San Francisco	Federation Labor Union, No. 14374
441	Vallejo	National Federation of Post Office Clerks, No. 45
		XII. Stationary Engine Men.
		Dredgermen—
442	San Francisco	International Brotherhood of Steam Shovel and Dredgermen, No. 4.
		Engineers, Stationary—
443	Bakersfield	International Union of Steam and Operating Engineers, No. 469.
444	Fresno	International Union of Steam and Operating Engineers, No. 336.
445	Los Angeles	International Union of Steam and Operating Engineers, No. 72.
446	Oakland	International Union of Steam and Operating Engineers, No. 507.
447	Sacramento	International Union of Steam and Operating Engineers, No. 210.
448	San Francisco	International Union of Steam and Operating Engineers, No. 59.
449	San Pedro	International Union of Steam and Operating Engineers, No. 235.
450	Santa Rosa	International Union of Steam and Operating Engineers, No. 147.

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Barbers	Male	Week	18 00	10½	69	423
Barbers	Male	Week	15 00	9½	60	424
Barbers	Male	Week	[43]15 00	10½	66½	425
Barbers	Male	Week	[44]16 00	12	76	426
Barbers	Male	--------	--------------	9¾	------	427
Barbers	Male	Week	17 00	10½	66	428
Barbers	Male	Week	[45]16 00	10½	65	429
Clerks	Male	Month	65 00	10	62	430
Clerks	Female	Month	35 00	8	48	
Salesmen	Male	Day	3 50	9	56	431
Loaders	Male	Day	3 50	9	54	
Clerks	Male	Day	--------------	9½	60	432
Clerks	Female	Day	--------------	8	48	
Clerks	Male	Day	--------------	10	63	433
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Office employees	M. & F.	--------	--------------	7-8	------	435
Post office clerks	M. & F.	Year	800 00-1200 00	8	48	436
Post office clerks	M. & F.	Year	800 00-1200 00	8	48	437
Post office clerks	M. & F.	Year	800 00-1200 00	8	48	438
Post office clerks	M. & F.	Year	800 00-1200 00	8	56	439
Mechanics	M. & F.	Year	600 00-1080 00	------	------	440
Post office clerks	M. & F.	Year	800 00-1200 00	8	48	441
Engineers	Male	Month	100 00	8-10	------	442
Cranesmen and firemen	Male	Month	100 00	8-10	------	
Chief engineers	Male	Month	[46]150 00	8	56	443
Operating engineers	Male	Month	[47]125 00	8	56	
Apprentices	Male	Month	[48]90 00	8	56	
Engineers, hoisting	Male	Day	6 00	8	56	444
Engineers, portable	Male	Day	4 00	9	63	
Engineers, brewery	Male	Day	4 50	8	48	445
Stationary engineers	Male	Day	3 00-4 50	8-9	48-54	446
Stationary engineers	Male	Day	4 00	8	48	447
Engineers, hoisting	Male	Day	6 00	8	48	
Engineers	Male	Day	6 00	8-9	44-54	448
Engineers, crane	Male	Hour	50	9	63	449
Engineers, stationary	Male	Week	21 00	9	63	
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[43] Plus 60 per cent of receipts over $22.00.
[44] October, 1915, wages increased from $15.00 per week.
[45] Plus 60 per cent of receipts over $25.00.
[46] July, 1915, salary increased from $135.00 per month.
[47] July, 1915, salary increased from $100.00 per month.
[48] July, 1915, salary increased from $75.00 per month.

LABOR ORGANIZATIONS: SHOWING RATES OF WAGES

No.	Locality	Trade and organization
		XII. Stationary Engine Men—Continued.
		Engineers, Stationary—Continued.
451	Stockton	International Union of Steam and Operating Engineers, No. 200.
452	Sutter Creek	International Union of Steam and Operating Engineers, No. 223.
		Firemen, Stationary—
453	Los Angeles	International Brotherhood of Stationary Firemen, No. 220.
454	Sacramento	International Brotherhood of Stationary Firemen, No. 149.
455	San Francisco	International Brotherhood of Stationary Firemen, No. 86.
		XIII. Miscellaneous.
		(a) LEATHER AND LEATHER GOODS.
		Leather Workers—
456	Los Angeles	Traveling Goods and Leather Novelty Workers' International Union of America, No. 9.
457	San Francisco	United Brotherhood of Leather Workers on Horse Goods, No. 57.
		(b) GLASS AND GLASSWARE.
		Glass Bottle Blowers and Capers—
458	San Francisco	Glass Bottle Blowers' Association of the United States and Canada, No. 22.
		(c) CLAY PRODUCTS.
		Pottery Workers—
459	Richmond	National Brotherhood of Operative Potters, No. 89
		(d) OTHER DISTINCT TRADES.
		Janitors, Porters and Elevatormen—
460	San Francisco	Elevator Conductors and Starters, No. 13105
		Milkers—
461	San Francisco	Milkers' Protective Union, No. 8861
		Miners—
462	Bodie	Western Federation of Miners, No. 61
463	Grass Valley	Western Federation of Miners, No. 90
464	Jackson	Western Federation of Miners, No. 135
465	Randsburg	Western Federation of Miners, No. 44
		Sugar Workers—
466	San Francisco	Sugar Workers' Union, No. 10519
		(e) MIXED EMPLOYMENT.
467	San Francisco	San Francisco Bootblack Protective Union, No. 10175

AND HOURS OF LABOR ON JANUARY 1, 1916—Continued.

Occupation	Sex	Rates of wages		Hours of labor		No.
		Unit	Rates	On first 5 days	Weekly	
Firemen	Male	Day	3 85	8	48	454
Firemen	Male	Month	100 00	8	48	455
Engineers, stationary	Male	Day	3 75–4 50	-------	-------	451
Engineers, hoisting	Male	Day	3 50	8	54	452
Firemen	Male	Month	60 00–90 00	8	56	453
Oilers	Male	Month	90 00	8	48	
Boiler cleaners	Male	Month	90 00	8	48	
Trunk makers	Male	Week	16 50	9	53	456
Saddle makers	Male	Piece	Av.wk. 15 00	9	54	457
Harness makers	Male	Day	3 25–3 50	9	54	
Hand bottle makers	Male	Piece	Av. day 5 00	8½	50	458
Machine bottle makers	Male	Day	5 00	9	53	
Pottery workers	Male	Piece	Av.wk. 25 00	8	48	459
Elevator conductors	Male	Hour	30	9	63	460
Milkers, can & bottle washers	Male	Month	$50 and found	9	60	461
Butter makers	Male	Month	100 00	9	54	
Pasteurizers	Male	Month	90 00	9	54	
Miners	Male	Day	4 00	8	56	462
Timbermen	Male	Day	3 25	8	56	463
Miners	Male	Day	3 00	8	56	
Car men	Male	Day	2 50	8	56	
Muckers	Male	Day	2 25–2 50	8	56	
Miners	Male	Day	3 00	8	56	464
Muckers	Male	Day	2 62	8	56	
Surface workers	Male	Day	2 50	9	63	
Machine men	Male	Day	4 00	8	56	465
Miners	Male	Day	3 50	8	56	
Muckers	Male	Day	3 00	8	56	
Timbermen	Male	Day	4 00	8	56	
Liquor men	Male	Hour	27½	11½	69½	466
Sugar boilers	Male	Month	85 00–110 00	8	48	
Sugar workers	Male	Hour	25	11½	69½	
Bootblacks	Male	Week	Av. 12 00	12	83	467

MANUFACTURES.

Statistics of manufactures were first presented in the Sixteenth Biennial Report of the bureau. We have endeavored to bring the manufacturers to a realization of the importance of this information but it has proved a slow and trying task. However, we believe that with a little more educational work this branch of the bureau's activities will be improved and a complete directory of the manufacturing establishments and their economic value made available to the public.

The data collected for the calendar year 1916 is presented in this report by industries, in separate tables, for the state and for the cities of San Francisco and Los Angeles.

The industries are classified and the same table number is used to designate the same industries in all the tabulations.

The tabulations for the state cover 2,251 establishments employing a total of 74,026 male and 22,779 female wage earners; and 14,517 male and 2,871 female salaried employees, making a total of 114,193 persons employed in these establishments on December 15, 1916, or the nearest representative date.

The annual wages paid to all these employees amounted to $86,322,539, of which $61,982,687 was paid to wage earners.

The weekly wage rates of wage earners have been tabulated and are given in four classifications. Of the male wage earners, eighteen years and over, 35.5 per cent received under $15.00 per week; of the female wage earners, eighteen years and over, 43.7 per cent received under $9.00 per week.

The number of wage earners employed during each month of the year has been tabulated in order to show the fluctuation in employment. The number of male employees fluctuated from 58,209 in January to a maximum of 73,727 in September, or an increase of 27 per cent from the lowest to the highest number. The number of female employees fluctuated from 11,473 in January to 22,086 in August, or an increase of 93 per cent between the lowest and the highest number. This large fluctuation is due to the seasonal industries such as canning and dried fruit packing.

The tabulations cover 699 establishments reporting in San Francisco and 547 establishments reporting in Los Angeles.

CLASSIFICATION OF INDUSTRIES.

Table 1. All Industries (Total).
Table 2. Agricultural Implements.
Table 3. Artificial Stone, Clay and Concrete Products.
Table 4. Automobiles (including Bodies and Parts).
Table 5. Awnings, Tents and Sails.
Table 6. Babbitt Metal and Solder.
Table 7. Bags, other than paper.
Table 8. Bakery Products.
Table 9. Baking Powders and Yeast.
Table 10. Baskets, Fruit and Berry, etc.
Table 11. Boilers and Tanks.
Table 12. Boots and Shoes.
Table 13. Boxes, Bags, Cartons, etc., Paper.
Table 14. Boxes, Wood.
Table 15. Brass, Bronze and Copper Products.
Table 16. Brick and Tile.
Table 17. Brooms and Brushes.
Table 18. Butter, Cheese and Condensed Milk.
Table 19. Cans, Tin.
Table 20. Canning and Packing of Fish.
Table 21. Canning and Preserving of Fruit and Vegetables.
Table 22. Carbonated Beverages.
Table 23. Carriages, Wagons and Materials.
Table 24. Caskets and Undertakers' Supplies.
Table 25. Cement.
Table 26. Chemicals (including Chemical Fertilizers).
Table 27. Clothing, Men's.
Table 28. Clothing, Women's.
Table 29. Coffee and Spice Roasting and Grinding.
Table 30. Confectionery.
Table 31. Cooperage and Wooden Goods, not elsewhere specified.
Table 32. Electrical Machinery, Apparatus and Supplies.
Table 33. Electro-Plating.
Table 34. Engines and Pumps—Gas, Gasoline, etc.
Table 35. Explosives.
Table 36. Felt and Felt Products.
Table 37. Flour Mill and Grist Mill Products.
Table 38. Food Preparations.
Table 39. Foundry and Machine Shop Products.
Table 40. Furniture, Bank and Store Fixtures, etc.
Table 41. Gas (in containers).
Table 42. Gas and Electric Fixtures.
Table 43. Glass, Cutting and Ornamenting (including Mirrors).
Table 44. Gloves, Leather.
Table 45. Glue and Tallow.
Table 46. Hats and Caps, Men's.
Table 47. Ice, Manufactured.
Table 48. Iron and Steel Forgings, Bolts and Nuts.
Table 49. Iron and Steel, Structural and Ornamental.
Table 50. Jewelry.
Table 51. Knit Goods.
Table 52. Laundries (Steam).
Table 53. Leather Goods.
Table 54. Liquors, Distilled.
Table 55. Liquors, Malt.
Table 56. Liquors, Vinous.
Table 57. Lumber Industry—Planing Mills.
Table 58. Lumber Industry—Sash and Door Mills and House Finish.
Table 59. Lumber Industry—Sawmills and Logging Operations.
Table 60. Lumber Industry—Shingle Mills.

CLASSIFICATION OF INDUSTRIES—(Continued).

Table 61. Marble and Stone Work.
Table 62. Mattresses, Pillows and Bedding.
Table 63. Metal Signs, Stencils and Rubber Stamps.
Table 64. Millinery.
Table 65. Oil Stoves and Oil Burning Equipment.
Table 66. Oil Well Tools and Supplies.
Table 67. Packing and Processing of Dried Fruits.
Table 68. Paints and Varnishes.
Table 69. Paper and Paper Goods (not elsewhere specified).
Table 70. Patent Medicines, Compounds and Druggists' Preparations.
Table 71. Petroleum, Refining.
Table 72. Photo-Engraving, Electrotyping and Stereotyping.
Table 73. Printing and Publishing.
Table 74. Rock, Quarrying and Crushing.
Table 75. Roofing Materials and Building Paper.
Table 76. Rubber Goods—Mechanical and Rubber Specialties.
Table 77. Salt.
Table 78. Sheet Metal Products (not including Tin Cans).
Table 79. Ship Building (including Boat Building).
Table 80. Slaughtering and Meat Packing.
Table 81. Smelting and Refining.
Table 82. Soap, Washing Powder, etc.
Table 83. Stoves and Furnaces (not including Oil Stoves).
Table 84. Sugar Refining.
Table 85. Tanning.
Table 86. Tobacco Manufactures.
Table 87. Trunks, Valises, etc.
Table 88. Window Shades.
Table 89. Wire Work (including Wire Rope, Netting, etc.).
Table 90. All other Industries.

TABLE No. 1. ALL INDUSTRIES (TOTAL).

(2,251 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	4,140	94
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	10,007	2,740
Under 18 years of age	370	37
Totals	14,517	2,871
Wage earners:		
18 years of age and over	22,710	21,875
Under 18 years of age	1,316	904
Totals	74,026	22,779

Salary and wage payments—annual:	
Officers, superintendents and managers	$10,851,490
Clerks, stenographers, salesmen, etc.	13,488,362
Wage earners (including piece workers)	61,982,687
Total	$86,322,539

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	292	536	274	45	1,147
$4 to $4.99	137	369	75	60	641
$5 to $5.99	225	741	165	121	1,252
$6 to $6.99	491	2,030	243	179	3,043
$7 to $7.99	815	3,007	197	149	4,168
$8 to $8.99	735	2,878	84	130	3,827
$9 to $9.99	1,857	3,453	98	63	5,471
$10 to $10.99	2,525	2,704	76	47	5,352
$11 to $11.99	1,877	1.266	38	45	3,226
$12 to $12.99	7,194	1,569	45	32	8,840
$13 to $13.99	6,142	809	16	13	6.980
$14 to $14.99	3,492	566	-----	7	3,965
$15 to $17.99	16,734	1,326	4	9	18,073
$18 to $20.99	11,683	411	1	2	12,097
$21 to $24.99	10,605	121	-----	2	10.728
$25 and over	7,906	89	-----	-----	7.995
Totals	72,710	21,875	1,316	904	96,805

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	58,209	11,473	69,682
February	58,305	11.612	69,917
March	59.500	11.675	71,175
April	63,771	12,686	76,457
May	64,492	12,806	77,298
June	66.746	14,962	81,708
July	68,120	20,526	88,646
August	71,806	22.086	93,892
September	73,727	20.986	94,713
October	72,788	18,096	90,884
November	68.698	15,342	84,040
December	64,531	14,113	78,644

TABLE No. 2. AGRICULTURAL IMPLEMENTS.

(8 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	50	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	176	35
Under 18 years of age	3	1
Totals	229	36
Wage earners:		
18 years of age and over	853	
Under 18 years of age	1	
Totals	854	

Salary and wage payments—annual:	
Officers, superintendents and managers	$135,124
Clerks, stenographers, salesmen, etc.	267,030
Wage earners (including piece workers)	696,241
Total	$1,098,395

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	12				12
$7 to $7.99	5		1		6
$8 to $8.99	8				8
$9 to $9.99	16				16
$10 to $10.99	13				13
$11 to $11.99	10				10
$12 to $12.99	45				45
$13 to $13.99	75				75
$14 to $14.99	8				8
$15 to $17.99	232				232
$18 to $20.99	154				154
$21 to $24.99	216				216
$25 and over	59				59
Totals	853		1		854

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	847		847
February	881		881
March	917		917
April	994		994
May	812		812
June	788		788
July	675		675
August	719		719
September	771		771
October	821		821
November	838		838
December	845		845

TABLE No. 3. ARTIFICIAL STONE, CLAY AND CONCRETE PRODUCTS.

(32 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	44	2
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	31	11
Under 18 years of age	1	
Totals	76	13
Wage earners:		
18 years of age and over	618	
Under 18 years of age	1	
Totals	619	

Salary and wage payments—annual:	
Officers, superintendents and managers	$110,907
Clerks, stenographers, salesmen, etc.	50,851
Wage earners (including piece workers)	443,984
Total	$605,742

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99	1				1
$5 to $5.99					
$6 to $6.99	2				2
$7 to $7.99			1		1
$8 to $8.99					
$9 to $9.99	2				2
$10 to $10.99	6				6
$11 to $11.99	27				27
$12 to $12.99	150				150
$13 to $13.99	73				73
$14 to $14.99	21				21
$15 to $17.99	166				166
$18 to $20.99	80				80
$21 to $24.99	55				55
$25 and over	35				35
Totals	618		1		619

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	569		569
February	560		560
March	594		594
April	610		610
May	610		610
June	626		626
July	671		671
August	637		637
September	605		605
October	605		605
November	566		566
December	540		540

TABLE No. 4. AUTOMOBILES (including bodies and parts).

(28 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	45	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	32	23
Under 18 years of age	1	
Totals	78	24
Wage earners:		
18 years of age and over	442	6
Under 18 years of age	4	
Totals	446	6

Salary and wage payments—annual:	
Officers, superintendents and managers	$81,483
Clerks, stenographers, salesmen, etc.	40,283
Wage earners (including piece workers)	365,566
Total	$487,332

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	8		2		10
$7 to $7.99	9				9
$8 to $8.99	3	1			4
$9 to $9.99	8	1	2		11
$10 to $10.99	6	1			7
$11 to $11.99	2				2
$12 to $12.99	28				28
$13 to $13.99	27	1			28
$14 to $14.99	16				16
$15 to $17.99	65	2			67
$18 to $20.99	121				121
$21 to $24.99	100				100
$25 and over	49				49
Totals	442	6	4		452

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	386	6	392
February	389	6	395
March	404	6	410
April	410	6	416
May	419	6	425
June	414	6	420
July	426	6	432
August	425	6	431
September	333	6	339
October	443	6	449
November	454	6	460
December	448	6	454

TABLE No. 5. AWNINGS, TENTS AND SAILS.

(15 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	17	-----------
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	9	11
Under 18 years of age	-----------	-----------
Totals	26	11
Wage earners:		
18 years of age and over	69	44
Under 18 years of age	1	-----------
Totals	70	44

Salary and wage payments—annual:	
Officers, superintendents and managers	$17,252
Clerks, stenographers, salesmen, etc.	12,970
Wage earners (including piece workers)	81,924
Total	$112,146

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	-----------	-----------	-----------	-----------	-----------
$4 to $4.99	-----------	-----------	-----------	-----------	-----------
$5 to $5.99	-----------	-----------	-----------	-----------	-----------
$6 to $6.99	-----------	1	-----------	-----------	1
$7 to $7.99	-----------	3	-----------	-----------	3
$8 to $8.99	2	6	-----------	-----------	8
$9 to $9.99	2	13	1	-----------	16
$10 to $10.99	3	7	-----------	-----------	10
$11 to $11.99	1	3	-----------	-----------	4
$12 to $12.99	2	9	-----------	-----------	11
$13 to $13.99	-----------	-----------	-----------	-----------	-----------
$14 to $14.99	2	-----------	-----------	-----------	2
$15 to $17.99	18	2	-----------	-----------	20
$18 to $20.99	13	-----------	-----------	-----------	13
$21 to $24.99	3	-----------	-----------	-----------	3
$25 and over	23	-----------	-----------	-----------	23
Totals	69	44	1	-----------	114

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	60	42	102
February	62	41	103
March	60	50	110
April	71	57	128
May	73	57	130
June	73	51	124
July	75	53	128
August	67	54	121
September	67	51	118
October	71	47	118
November	68	44	112
December	65	44	109

TABLE No. 6. BABBITT METAL AND SOLDER.

(3 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	7	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	6	6
Under 18 years of age		
Totals	13	6
Wage earners:		
18 years of age and over	35	
Under 18 years of age		
Totals	35	

Salary and wage payments—annual:	
Officers, superintendents and managers	$26,560
Clerks, stenographers, salesmen, etc.	9,957
Wage earners (including piece workers)	30,129
Total	$66,646

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99	2				2
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	2				2
$13 to $13.99	2				2
$14 to $14.99	1				1
$15 to $17.99	7				7
$18 to $20.99	10				10
$21 to $24.99	9				9
$25 and over	2				2
Totals	35				35

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	33		33
February	33		33
March	35		35
April	35		35
May	37		37
June	37		37
July	37		37
August	37		37
September	35		35
October	35		35
November	35		35
December	35		35

TABLE No. 7. BAGS, OTHER THAN PAPER.

(4 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	12	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	28	13
Under 18 years of age		
Totals	40	13
Wage earners:		
18 years of age and over	138	220
Under 18 years of age	4	21
Totals	142	241

Salary and wage payments—annual:	
Officers, superintendents and managers	$52,405
Clerks, stenographers, salesmen, etc.	56,342
Wage earners (including piece workers)	205,402
Total	$314,149

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1	31	1	13	46
$7 to $7.99	4	45	2	5	56
$8 to $8.99	4	34		2	40
$9 to $9.99	4	25	1	1	31
$10 to $10.99	9	49			58
$11 to $11.99	3	12			15
$12 to $12.99	15	11			26
$13 to $13.99	11	9			20
$14 to $14.99	2	1			3
$15 to $17.99	28	2			30
$18 to $20.99	30				30
$21 to $24.99	22	1			23
$25 and over	5				5
Totals	138	220	4	21	383

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	159	137	296
February	144	165	309
March	134	214	348
April	159	295	454
May	152	262	414
June	182	344	526
July	159	320	479
August	161	260	421
September	142	254	396
October	144	247	391
November	125	187	312
December	125	140	265

TABLE No. 8. BAKERY PRODUCTS.

(78 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	111	8
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	383	69
Under 18 years of age	1	2
Totals	495	79
Wage earners:		
18 years of age and over	1,454	561
Under 18 years of age	24	17
Totals	1,478	578

Salary and wage payments—annual:	
Officers, superintendents and managers	$335,703
Clerks, stenographers, salesmen, etc.	481,208
Wage earners (including piece workers)	1,502,874
Total	$2,319,785

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	2	1			3
$4 to $4.99			12	12	24
$5 to $5.99	15	18			33
$6 to $6.99	5	99	6	4	114
$7 to $7.99	45	83			128
$8 to $8.99	22	43	2	1	68
$9 to $9.99	27	151			178
$10 to $10.99	50	84	1		135
$11 to $11.99	15	18	3		36
$12 to $12.99	85	26			111
$13 to $13.99	28	9			37
$14 to $14.99	44	6			50
$15 to $17.99	336	19			355
$18 to $20.99	389	4			393
$21 to $24.99	262				262
$25 and over	129				129
Totals	1,454	561	24	17	2,056

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	1,457	564	2,021
February	1,468	563	2,031
March	1,486	582	2,068
April	1,484	568	2,052
May	1,469	565	2,034
June	1,450	574	2,024
July	1,460	574	2,034
August	1,481	556	2,037
September	1,484	556	2,040
October	1,476	569	2,045
November	1,488	603	2,091
December	1,497	615	2,112

TABLE No. 9. BAKING POWDERS AND YEAST.

(2 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	4	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	48	20
Under 18 years of age		
Totals	52	20
Wage earners:		
18 years of age and over	40	10
Under 18 years of age		
Totals	40	10

Salary and wage payments—annual:	
Officers, superintendents and managers	$6,050
Clerks, stenographers, salesmen, etc.	40,714
Wage earners (including piece workers)	35,198
Total	$81,962

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1	3			4
$7 to $7.99		3			3
$8 to $8.99		2			2
$9 to $9.99		2			2
$10 to $10.99	2				2
$11 to $11.99					
$12 to $12.99	2				2
$13 to $13.99	7				7
$14 to $14.99	9				9
$15 to $17.99	12				12
$18 to $20.99	4				4
$21 to $24.99	3				3
$25 and over					
Totals	40	10			50

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	24	1	25
February	24	1	25
March	24	2	26
April	24	2	26
May	24	2	26
June	24	2	26
July	38	10	48
August	36	10	46
September	38	10	48
October	38	10	48
November	41	10	51
December	40	10	50

TABLE No. 10. BASKETS, FRUIT AND BERRY, ETC.

(3 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	4	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	3	
Under 18 years of age		
Totals	7	
Wage earners:		
18 years of age and over	15	15
Under 18 years of age		2
Totals	15	17

Salary and wage payments—annual:	
Officers, superintendents and managers	$6,200
Clerks, stenographers, salesmen, etc	1,500
Wage earners (including piece workers)	10,460
Total	$18,160

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	8	12			20
$4 to $4.99					
$5 to $5.99		1			1
$6 to $6.99					
$7 to $7.99				2	2
$8 to $8.99		1			1
$9 to $9.99					
$10 to $10.99		1			1
$11 to $11.99					
$12 to $12.99					
$13 to $13.99					
$14 to $14.99	1				1
$15 to $17.99	5				5
$18 to $20.99					
$21 to $24.99					
$25 and over	1				1
Totals	15	15		2	32

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	7	5	12
February	8	5	13
March	9	6	15
April	9	18	27
May	16	19	35
June	16	20	36
July	16	9	25
August	7	9	16
September	6	6	12
October	6	5	11
November	6	4	10
December	6	5	11

TABLE No. 11. BOILERS AND TANKS.

(15 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	26	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	17	5
Under 18 years of age		
Totals	43	5
Wage earners:		
18 years of age and over	250	
Under 18 years of age	2	
Totals	252	

Salary and wage payments—annual:	
Officers, superintendents and managers	$68,336
Clerks, stenographers, salesmen, etc.	24,228
Wage earners (including piece workers)	320,016
Total	$412,580

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	1				1
$6 to $6.99	1				1
$7 to $7.99	2		1		3
$8 to $8.99					
$9 to $9.99	5		1		6
$10 to $10.99	2				2
$11 to $11.99					
$12 to $12.99	4				4
$13 to $13.99	5				5
$14 to $14.99	11				11
$15 to $17.99	60				60
$18 to $20.99	33				33
$21 to $24.99	92				92
$25 and over	34				34
Totals	250		2		252

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	260		260
February	273		273
March	278		278
April	286		286
May	317		317
June	283		283
July	255		255
August	264		264
September	248		248
October	244		244
November	252		252
December	227		227

TABLE No. 12. BOOTS AND SHOES.

(6 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	10	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	25	12
Under 18 years of age		
Totals	35	13
Wage earners:		
18 years of age and over	299	104
Under 18 years of age	5	
Totals	304	104

Salary and wage payments—annual:	
Officers, superintendents and managers	$24,943
Clerks, stenographers, salesmen, etc.	36,101
Wage earners (including piece workers)	216,255
Total	$277,299

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	2	3	1		6
$6 to $6.99	9	13	1		23
$7 to $7.99	9	9	1		19
$8 to $8.99	6	17	1		24
$9 to $9.99	26	9			35
$10 to $10.99	15	15	1		31
$11 to $11.99	9	9			18
$12 to $12.99	22	13			35
$13 to $13.99	22	8			30
$14 to $14.99	14	1			15
$15 to $17.99	66	4			70
$18 to $20.99	63	3			66
$21 to $24.99	23				23
25 and over	13				13
Totals	299	104	5		408

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	242	87	329
February	242	83	325
March	241	87	328
April	250	85	335
May	257	88	345
June	244	85	329
July	237	83	320
August	287	98	385
September	286	101	387
October	302	109	411
November	305	108	413
December	298	102	400

TABLE No. 13. BOXES, BAGS, CARTONS, ETC., PAPER.

(20 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	45	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	35	12
Under 18 years of age		
Totals	80	13
Wage earners:		
18 years of age and over	235	362
Under 18 years of age	13	62
Totals	248	424

Salary and wage payments—annual:	
Officers, superintendents and managers	$92,447
Clerks, stenographers, salesmen, etc.	55,981
Wage earners (including piece workers)	329,533
Total	$477,961

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99				11	11
$5 to $5.99		43	1	29	73
$6 to $6.99	4	72	3	11	90
$7 to $7.99	3	72	2	3	80
$8 to $8.99	5	52	4	4	65
$9 to $9.99	11	45	3	2	61
$10 to $10.99	15	40		2	57
$11 to $11.99	6	16			22
$12 to $12.99	34	13			47
$13 to $13.99	18	6			24
$14 to $14.99	7				7
$15 to $17.99	49	2			51
$18 to $20.99	43	1			44
$21 to $24.99	18				18
$25 and over	22				22
Totals	235	362	13	62	672

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	238	417	655
February	236	399	635
March	237	412	649
April	227	382	609
May	227	362	589
June	226	340	566
July	241	360	601
August	233	394	627
September	243	446	689
October	254	506	760
November	266	480	746
December	267	475	742

TABLE No. 14. BOXES, WOOD.

(13 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	27	------
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	24	7
Under 18 years of age	------	------
Totals	51	7
Wage earners:		
18 years of age and over	442	68
Under 18 years of age	6	5
Totals	448	73

Salary and wage payments—annual:	
Officers, superintendents and managers	$61,576
Clerks, stenographers, salesmen, etc.	31,072
Wage earners (including piece workers)	319,412
Total	$412,060

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	------	------	------	------	------
$4 to $4.99	1	------	------	------	1
$5 to $5.99	------	------	1	------	1
$6 to $6.99	2	9	4	2	17
$7 to $7.99	6	29	1	1	37
$8 to $8.99	15	8	------	1	24
$9 to $9.99	36	11	------	1	48
$10 to $10.99	31	5	------	------	36
$11 to $11.99	42	3	------	------	45
$12 to $12.99	19	2	------	------	21
$13 to $13.99	27	------	------	------	27
$14 to $14.99	54	1	------	------	55
$15 to $17.99	139	------	------	------	139
$18 to $20.99	31	------	------	------	31
$21 to $24.99	17	------	------	------	17
$25 and over	22	------	------	------	22
Totals	442	68	6	5	521

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	438	81	519
February	405	80	485
March	424	78	502
April	436	71	507
May	423	72	495
June	422	73	495
July	510	86	596
August	437	88	525
September	438	81	519
October	445	77	522
November	440	76	516
December	455	72	527

TABLE No. 15. BRASS, BRONZE AND COPPER PRODUCTS.

(20 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	35	5
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	24	4
Under 18 years of age	1	
Totals	60	9
Wage earners:		
18 years of age and over	267	
Under 18 years of age		
Totals	267	

Salary and wage payments—annual:	
Officers, superintendents and managers	$81,005
Clerks, stenographers, salesmen, etc.	24,132
Wage earners (including piece workers)	233,072
Total	$338,209

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	1				1
$6 to $6.99	2				2
$7 to $7.99	5				5
$8 to $8.99					
$9 to $9.99	9				9
$10 to $10.99	4				4
$11 to $11.99	1				1
$12 to $12.99	12				12
$13 to $13.99	11				11
$14 to $14.99	5				5
$15 to $17.99	37				37
$18 to $20.99	37				37
$21 to $24.99	89				89
$25 and over	54				54
Totals	267				267

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	243		243
February	253		253
March	248		248
April	258		258
May	253		253
June	250		250
July	254		254
August	250		250
September	261		261
October	261		261
November	285		285
December	278		278

TABLE No. 16. BRICK AND TILE.

(25 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	39	3
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	40	8
Under 18 years of age		
Totals	79	11
Wage earners:		
18 years of age and over	762	
Under 18 years of age	10	
Totals	772	

Salary and wage payments—annual:	
Officers, superintendents and managers	$80,003
Clerks, stenographers, salesmen, etc.	50,070
Wage earners (including piece workers)	460,156
Totals	$590,229

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	6				6
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	2		3		5
$7 to $7.99	5		7		12
$8 to $8.99					
$9 to $9.99	20				20
$10 to $10.99	67				67
$11 to $11.99	3				3
$12 to $12.99	141				141
$13 to $13.99	165				165
$14 to $14.99	8				8
$15 to $17.99	231				231
$18 to $20.99	62				62
$21 to $24.99	37				37
$25 and over	15				15
Totals	762		10		772

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	598		598
February	642		642
March	717		717
April	791		791
May	801		801
June	945		945
July	909		909
August	905		905
September	747		747
October	718		718
November	683		683
December	643		643

TABLE No. 17. BROOMS AND BRUSHES.

(8 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	5	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	2	
Under 18 years of age		
Totals	7	
Wage earners:		
18 years of age and over	73	
Under 18 years of age		
Totals	73	

Salary and wage payments—annual:	
Officers, superintendents and managers	$5,665
Clerks, stenographers, salesmen, etc.	1,660
Wage earners (including piece workers)	41,417
Total	$48,742

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99	11				11
$8 to $8.99					
$9 to $9.99	4				4
$10 to $10.99	1				1
$11 to $11.99					
$12 to $12.99	14				14
$13 to $13.99	5				5
$14 to $14.99	2				2
$15 to $17.99	15				15
$18 to $20.99	12				12
$21 to $24.99	5				5
25 and over	4				4
Totals	73				73

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	73		73
February	73		73
March	73		73
April	73		73
May	73		73
June	73		73
July	73		73
August	73		73
September	73		73
October	73		73
November	73		73
December	73		73

TABLE No. 18. BUTTER, CHEESE, AND CONDENSED MILK.

(32 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	63	2
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	93	56
Under 18 years of age	1	
Totals	157	58
Wage earners:		
18 years of age and over	570	40
Under 18 years of age		2
Totals	570	42

Salary and wage payments—annual:	
Officers, superintendents and managers	$118,245
Clerks, stenographers, salesmen, etc	144,955
Wage earners (including piece workers)	566,026
Total	$829,226

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99	1				1
$5 to $5.99					
$6 to $6.99					
$7 to $7.99	3				3
$8 to $8.99		13		2	15
$9 to $9.99	8	7			15
$10 to $10.99	4	1			5
$11 to $11.99	2	9			11
$12 to $12.99	14	3			17
$13 to $13.99	7	3			10
$14 to $14.99	30	2			32
$15 to $17.99	140	1			141
$18 to $20.99	135	1			136
$21 to $24.99	126				126
$25 and over	100				100
Totals	570	40		2	612

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	512	39	551
February	517	40	557
March	556	41	597
April	587	43	630
May	599	48	647
June	604	57	661
July	599	62	661
August	597	60	657
September	576	55	631
October	552	50	602
November	527	46	573
December	527	46	573

TABLE No. 19. CANS, TIN.

(9 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	16	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	26	15
Under 18 years of age		
Totals	42	15
Wage earners:		
18 years of age and over	1,068	108
Under 18 years of age	10	4
Totals	1,078	112

Salary and wage payments—annual:	
Officers, superintendents and managers	$37,497
Clerks, stenographers, salesmen, etc.	37,064
Wage earners (including piece workers)	711,820
Total	$786,381

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	2	1			3
$6 to $6.99	6	13	3	2	24
$7 to $7.99	40	20	5	2	67
$8 to $8.99	25	14	1		40
$9 to $9.99	100	19	1		120
$10 to $10.99	149	20			169
$11 to $11.99	44	7			51
$12 to $12.99	183	5			188
$13 to $13.99	96	3			99
$14 to $14.99	48	3			51
$15 to $17.99	188	3			191
$18 to $20.99	68				68
$21 to $24.99	81				81
$25 and over	38				38
Totals	1,068	108	10	4	1,190

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	740	118	858
February	915	116	1,031
March	993	117	1,110
April	1,067	109	1,176
May	1,118	119	1,237
June	1,115	119	1,234
July	1,075	111	1,186
August	1,161	113	1,274
September	1,165	113	1,278
October	935	105	1,040
November	851	99	950
December	832	99	931

TABLE No. 20. CANNING AND PACKING OF FISH.

(15 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	36	----------
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	20	4
Under 18 years of age	----------	----------
Totals	56	4
Wage earners:		
18 years of age and over	528	614
Under 18 years of age	17	2
Totals	545	616

Salary and wage payments—annual:	
Officers, superintendents and managers	$71,486
Clerks, stenographers, salesmen, etc.	24,426
Wage earners (including piece workers)	214,455
Total	$310,367

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	2	60	7	----------	69
$4 to $4.99	----------	34	----------	----------	34
$5 to $5.99	----------	27	----------	----------	27
$6 to $6.99	2	75	3	----------	80
$7 to $7.99	30	22	5	----------	57
$8 to $8.99	2	57	2	----------	61
$9 to $9.99	44	144	----------	2	190
$10 to $10.99	39	121	----------	----------	160
$11 to $11.99	39	13	----------	----------	52
$12 to $12.99	43	18	----------	----------	61
$13 to $13.99	5	10	----------	----------	15
$14 to $14.99	55	13	----------	----------	68
$15 to $17.99	181	12	----------	----------	193
$18 to $20.99	30	8	----------	----------	38
$21 to $24.99	36	----------	----------	----------	36
$25 and over	20	----------	----------	----------	20
Totals	528	614	17	2	1,161

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	86	3	89
February	58	3	61
March	71	3	74
April	84	18	102
May	170	69	239
June	371	584	955
July	355	727	1,082
August	618	755	1,373
September	690	650	1,340
October	529	319	848
November	435	238	673
December	416	111	527

TABLE No. 21. CANNING AND PRESERVING OF FRUITS AND VEGETABLES.

(84 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	168	2
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	428	104
Under 18 years of age		
Totals	596	106
Wage earners:		
18 years of age and over	5,046	7,829
Under 18 years of age	207	494
Totals	5,253	8,323

Salary and wage payments—annual:	
Officers, superintendents and managers	$396,936
Clerks, stenographers, salesmen, etc.	615,128
Wage earners (including piece workers)	2,587,984
Total	$3,600,048

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	26	195	21	42	284
$4 to $4.99	13	142	11	20	186
$5 to $5.99	9	282	30	46	367
$6 to $6.99	22	679	20	46	767
$7 to $7.99	44	894	47	72	1,057
$8 to $8.99	90	705	25	197	917
$9 to $9.99	196	999	24	44	1,263
$10 to $10.99	388	1,000	10	26	1,424
$11 to $11.99	314	522	10	40	886
$12 to $12.99	917	616	8	30	1,571
$13 to $13.99	638	437	1	13	1,089
$14 to $14.99	403	289		5	697
$15 to $17.99	1,152	751		9	1,912
$18 to $20.99	465	210		2	677
$21 to $24.99	222	64		2	288
$25 and over	147	44			191
Totals	5,046	7,829	207	494	13,576

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	1,199	640	1,839
February	1,182	576	1,758
March	1,009	396	1,405
April	1,409	1,331	2,740
May	1,761	1,561	3,322
June	2,129	2,870	4,999
July	3,462	7,879	11,341
August	4,624	9,011	13,635
September	4,283	6,982	11,265
October	2,941	3,257	6,198
November	1,923	1,213	3,136
December	1,559	1,034	2,593

TABLE No. 22. CARBONATED BEVERAGES.

(17 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	20	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	16	4
Under 18 years of age		
Totals	36	4
Wage earners:		
18 years of age and over	60	2
Under 18 years of age	2	
Totals	62	2

Salary and wage payments—annual:	
Officers, superintendents and managers	$31,402
Clerks, stenographers, salesmen, etc.	18,008
Wage earners (including piece workers)	57,766
Total	$107,176

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1				1
$7 to $7.99			1		1
$8 to $8.99					
$9 to $9.99	2	1			3
$10 to $10.99	2				2
$11 to $11.99	1		1		2
$12 to $12.99	3				3
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	25				25
$18 to $20.99	11				11
$21 to $24.99	9	1			10
$25 and over	6				6
Totals	60	2	2		64

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	52	2	54
February	52	2	54
March	60	2	62
April	62	2	64
May	64	2	66
June	68	2	70
July	69	2	71
August	68	2	70
September	67	2	69
October	73	2	75
November	66	2	68
December	59	2	61

TABLE No. 23. CARRIAGES, WAGONS AND MATERIALS.

(8 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	9	----------
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	5	3
Under 18 years of age	----------	----------
Totals	14	3
Wage earners:		
18 years of age and over	83	----------
Under 18 years of age	4	----------
Totals	87	----------

Salary and wage payments—annual:	
Officers, superintendents and managers	$12,326
Clerks, stenographers, salesmen, etc.	4,357
Wage earners (including piece workers)	67,651
Total	$84,334

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	----------	----------	----------	----------	----------
$4 to $4.99	----------	----------	----------	----------	----------
$5 to $5.99	----------	----------	----------	----------	----------
$6 to $6.99	----------	----------	1	----------	1
$7 to $7.99	1	----------	----------	----------	1
$8 to $8.99	1	----------	----------	----------	1
$9 to $9.99	1	----------	1	----------	2
$10 to $10.99	2	----------	1	----------	3
$11 to $11.99	1	----------	1	----------	2
$12 to $12.99	7	----------	----------	----------	7
$13 to $13.99	7	----------	----------	----------	7
$14 to $14.99	6	----------	----------	----------	6
$15 to $17.99	12	----------	----------	----------	12
$18 to $20.99	18	----------	----------	----------	18
$21 to $24.99	21	----------	----------	----------	21
$25 and over	6	----------	----------	----------	6
Totals	83	----------	4	----------	87

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	75	----------	75
February	78	----------	78
March	83	----------	83
April	92	----------	92
May	86	----------	86
June	86	----------	86
July	88	----------	88
August	88	----------	88
September	88	----------	88
October	103	----------	103
November	95	----------	95
December	90	----------	90

TABLE No. 24. CASKETS AND UNDERTAKERS' SUPPLIES.

(5 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	13	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	18	7
Under 18 years of age		
Totals	31	7
Wage earners:		
18 years of age and over	63	22
Under 18 years of age	1	1
Totals	64	23

Salary and wage payments—annual:	
Officers, superintendents and managers	$27,530
Clerks, stenographers, salesmen, etc	29,878
Wage earners (including piece workers)	62,975
Total	$120,383

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99				1	1
$6 to $6.99	1	1			2
$7 to $7.99		2			2
$8 to $8.99	1	4	1		6
$9 to $9.99	1	5			6
$10 to $10.99	3	1			4
$11 to $11.99		1			1
$12 to $12.99	4	1			5
$13 to $13.99	3	1			4
$14 to $14.99	4	1			5
$15 to $17.99	11	2			13
$18 to $20.99	12	1			13
$21 to $24.99	17	1			18
$25 and over	6	1			7
Totals	63	22	1	1	87

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	64	23	87
February	65	24	89
March	66	23	89
April	68	25	93
May	66	23	89
June	68	21	89
July	63	22	85
August	62	22	84
September	66	22	88
October	67	22	89
November	65	22	87
December	64	23	87

TABLE No. 25. CEMENT.

(12 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	51	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	270	19
Under 18 years of age	------------	------------
Totals	321	20
Wage earners:		
18 years of age and over	2,030	------------
Under 18 years of age	1	------------
Totals	2,031	------------

Salary and wage payments—annual:	
Officers, superintendents and managers	$197,428
Clerks, stenographers, salesmen, etc	310,585
Wage earners (including piece workers)	1,597,307
Total	$2,105,320

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	------------	------------	1	------------	1
$4 to $4.99	------------	------------	------------	------------	------------
$5 to $5.99	------------	------------	------------	------------	------------
$6 to $6.99	------------	------------	------------	------------	------------
$7 to $7.99	------------	------------	------------	------------	------------
$8 to $8.99	12	------------	------------	------------	12
$9 to $9.99	97	------------	------------	------------	97
$10 to $10.99	63	------------	------------	------------	63
$11 to $11.99	32	------------	------------	------------	32
$12 to $12.99	267	------------	------------	------------	267
$13 to $13.99	133	------------	------------	------------	133
$14 to $14.99	270	------------	------------	------------	270
$15 to $17.99	522	------------	------------	------------	522
$18 to $20.99	268	------------	------------	------------	268
$21 to $24.99	234	------------	------------	------------	234
$25 and over	132	------------	------------	------------	132
Totals	2,030	------------	1	------------	2,031

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	1,735	------------	1,735
February	1,549	------------	1,549
March	1,815	------------	1,815
April	2,111	------------	2,111
May	2,111	------------	2,111
June	2,275	------------	2,275
July	2,031	------------	2,031
August	1,916	------------	1,916
September	2,069	------------	2,069
October	2,115	------------	2,115
November	2,198	------------	2,198
December	1,942	------------	1,942

TABLE No. 26. CHEMICALS (including chemical fertilizers).

(21 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	35	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	40	14
Under 18 years of age		
Totals	75	14
Wage earners:		
18 years of age and over	246	1
Under 18 years of age		
Totals	246	1

Salary and wage payments—annual:	
Officers, superintendents and managers	$79,065
Clerks, stenographers, salesmen, etc.	57,740
Wage earners (including piece workers)	186,536
Total	$323,341

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99		1			1
$9 to $9.99	1				1
$10 to $10.99	15				15
$11 to $11.99					
$12 to $12.99	65				65
$13 to $13.99	17				17
$14 to $14.99	41				41
$15 to $17.99	69				69
$18 to $20.99	15				15
$21 to $24.99	14				14
$25 and over	9				9
Totals	246	1			247

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	247	1	248
February	264	1	265
March	271	1	272
April	247	1	248
May	223	1	224
June	217	1	218
July	209	1	210
August	223	1	224
September	233	1	234
October	237	1	238
November	251	1	252
December	245	1	246

TABLE No. 27. CLOTHING, MEN'S.

(24 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	40	4
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	77	43
Under 18 years of age	1	
Totals	118	47
Wage earners:		
18 years of age and over	233	1,455
Under 18 years of age	12	31
Totals	245	1,486

Salary and wage payments—annual:	
Officers, superintendents and managers	$115,656
Clerks, stenographers, salesmen, etc.	135,610
Wage earners (including piece workers)	781,155
Total	$1,032,421

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		52	1		53
$4 to $4.99		55		1	56
$5 to $5.99		58		5	63
$6 to $6.99	12	85	2	13	112
$7 to $7.99	5	126	4	6	141
$8 to $8.99	4	183	1	3	191
$9 to $9.99	10	180	1	1	192
$10 to $10.99	11	176	1	2	190
$11 to $11.99	2	126	1		129
$12 to $12.99	17	136	1		154
$13 to $13.99	14	80			94
$14 to $14.99	6	65			71
$15 to $17.99	30	85			115
$18 to $20.99	41	38			79
$21 to $24.99	59	8			67
$25 and over	22	2			24
Totals	233	1,455	12	31	1,731

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	202	1,192	1,394
February	218	1,278	1,496
March	216	1,272	1,488
April	221	1,314	1,535
May	220	1,384	1,604
June	218	1,484	1,702
July	232	1,504	1,736
August	234	1,452	1,686
September	232	1,451	1,683
October	238	1,483	1,721
November	243	1,487	1,730
December	244	1,503	1,747

TABLE No. 28. CLOTHING, WOMEN'S

(26 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	31	7
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	51	34
Under 18 years of age	6	7
Totals	88	48
Wage earners:		
18 years of age and over	115	452
Under 18 years of age	5	8
Totals	120	460

Salary and wage payments—annual:	
Officers, superintendents and managers	--------
Clerks, stenographers, salesmen, etc.	--------
Wages earners (including piece workers)	--------
Total	--------

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	3	30	--------	--------	33
$4 to $4.99	1	29	--------	--------	30
$5 to $5.99	2	13	--------	1	16
$6 to $6.99	6	56	3	6	71
$7 to $7.99	10	48	--------	1	59
$8 to $8.99	4	53	1	--------	58
$9 to $9.99	2	59	--------	--------	61
$10 to $10.99	15	44	1	--------	60
$11 to $11.99	2	17	--------	--------	19
$12 to $12.99	3	38	--------	--------	41
$13 to $13.99	2	9	--------	--------	11
$14 to $14.99	5	16	--------	--------	21
$15 to $17.99	7	28	--------	--------	35
$18 to $20.99	14	5	--------	--------	19
$21 to $24.99	11	3	--------	--------	14
$25 and over	28	4	--------	--------	32
Totals	115	452	5	8	580

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	103	374	477
February	110	391	501
March	122	448	570
April	113	454	567
May	105	441	546
June	109	434	543
July	115	444	559
August	119	424	543
September	123	454	577
October	130	502	632
November	123	482	605
December	120	469	589

TABLE No. 29. COFFEE AND SPICE ROASTING AND GRINDING.

(22 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	53	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	299	121
Under 18 years of age		
Totals	352	122
Wage earners:		
18 years of age and over	192	126
Under 18 years of age	2	1
Totals	194	127

Salary and wage payments—annual:	
Officers, superintendents and managers	$165,462
Clerks, stenographers, salesmen, etc.	492,046
Wage earners (including piece workers)	219,986
Total	$877,494

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	1				1
$4 to $4.99					
$5 to $5.99	1	1			2
$6 to $6.99	4	16		1	21
$7 to $7.99		30	2		32
$8 to $8.99	3	17			20
$9 to $9.99	4	40			44
$10 to $10.99	15	9			24
$11 to $11.99	10	7			17
$12 to $12.99	9	2			11
$13 to $13.99	6				6
$14 to $14.99	12	1			13
$15 to $17.99	34	3			37
$18 to $20.99	40				40
$21 to $24.99	30				30
$25 and over	23				23
Totals	192	126	2	1	321

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	197	118	315
February	194	118	312
March	199	127	326
April	193	126	319
May	193	124	317
June	196	131	327
July	201	138	339
August	202	131	333
September	194	126	320
October	202	134	336
November	201	132	333
December	189	124	313

TABLE No. 30. CONFECTIONERY.

(31 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	54	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	108	32
Under 18 years of age		
Totals	162	33
Wage earners:		
18 years of age and over	525	731
Under 18 years of age	2	8
Totals	527	739

Salary and wage payments—annual:	
Officers, superintendents and managers	$126,397
Clerks, stenographers, salesmen, etc.	132,709
Wage earners (including piece workers)	613,704
Total	$872,810

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		6			6
$4 to $4.99		10			10
$5 to $5.99	13	65		5	83
$6 to $6.99	35	189			224
$7 to $7.99	27	118	1	2	148
$8 to $8.99	18	99			117
$9 to $9.99	24	97	1	1	123
$10 to $10.99	43	45			88
$11 to $11.99	29	26			55
$12 to $12.99	32	48			80
$13 to $13.99	26	15			41
$14 to $14.99	46	3			49
$15 to $17.99	105	9			114
$18 to $20.99	50	1			51
$21 to $24.99	38				38
$25 and over	39				39
Totals	525	731	2	8	1,266

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	459	564	1,023
February	474	572	1,046
March	484	591	1,075
April	500	584	1,084
May	489	574	1,063
June	494	575	1,069
July	502	562	1,064
August	513	569	1,082
September	505	627	1,132
October	528	733	1,261
November	543	730	1,273
December	519	894	1,413

TABLE No. 31. COOPERAGE AND WOODEN GOODS, NOT ELSEWHERE SPECIFIED.

(14 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	25	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	14	7
Under 18 years of age		
Totals	39	7
Wage earners:		
18 years of age and over	238	56
Under 18 years of age	5	10
Totals	243	66

Salary and wage payments—annual:	
Officers, superintendents and managers	$44,710
Clerks, stenographers, salesmen, etc.	26,440
Wage earners (including piece workers)	176,340
Total	$247,490

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99		2		10	12
$5 to $5.99		7			7
$6 to $6.99	1	5			6
$7 to $7.99		14			14
$8 to $8.99	4	10			14
$9 to $9.99	3	6	1		10
$10 to $10.99	10		2		12
$11 to $11.99	2	5			7
$12 to $12.99	25	3	2		30
$13 to $13.99	50	2			52
$14 to $14.99	2	2			4
$15 to $17.99	42				42
$18 to $20.99	25				25
$21 to $24.99	64				64
$25 and over	10				10
Totals	238	56	5	10	309

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	195	54	249
February	202	82	284
March	242	92	334
April	186	110	296
May	188	111	299
June	181	110	291
July	201	129	330
August	195	108	303
September	235	94	329
October	230	92	322
November	237	82	319
December	243	66	309

TABLE No. 32. ELECTRICAL MACHINERY, APPARATUS AND SUPPLIES.

(21 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	34	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	53	81
Under 18 years of age	1	
Totals	88	82
Wage earners:		
18 years of age and over	661	191
Under 18 years of age	11	
Totals	672	191

Salary and wage payments—annual:	
Officers, superintendents and managers	$83,745
Clerks, stenographers, salesmen, etc	141,729
Wage earners (including piece workers)	481,049
Total	$706,523

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4			1		1
$4 to $4.99			2		2
$5 to $5.99		1	5		6
$6 to $6.99	1	64	2		67
$7 to $7.99	6	55	1		62
$8 to $8.99	36	54			90
$9 to $9.99	90	9			99
$10 to $10.99	32	5			37
$11 to $11.99	97	1			98
$12 to $12.99	75	1			76
$13 to $13.99	42				42
$14 to $14.99	53	1			54
$15 to $17.99	89				89
$18 to $20.99	58				58
$21 to $24.99	45				45
$25 and over	37				37
Totals	661	191	11		863

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	670	148	818
February	664	144	808
March	708	158	866
April	634	159	793
May	613	138	751
June	600	137	737
July	611	134	745
August	604	147	751
September	605	197	802
October	652	218	870
November	709	204	913
December	668	191	859

TABLE No. 33. ELECTROPLATING.

(4 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	7	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	1	
Under 18 years of age		
Totals	8	
Wage earners:		
18 years of age and over	18	
Under 18 years of age	1	
Totals	19	

Salary and wage payments—annual:	
Officers, superintendents and managers	$7,280
Clerks, stenographers, salesmen, etc.	780
Wage earners (including piece workers)	15,369
Total	$23,429

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99			1		1
$7 to $7.99	2				2
$8 to $8.99	1				1
$9 to $9.99	2				2
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	1				1
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	3				3
$18 to $20.99	3				3
$21 to $24.99	6				6
$25 and over					
Totals	18		1		19

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	20		20
February	18		18
March	20		20
April	19		19
May	17		17
June	17		17
July	17		17
August	18		18
September	20		20
October	19		19
November	19		19
December	20		20

TABLE No. 34. ENGINES AND PUMPS—GAS, GASOLINE, ETC.

(21 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	65	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	96	34
Under 18 years of age		
Totals	161	34
Wage earners:		
18 years of age and over	803	
Under 18 years of age	41	
Totals	844	

Salary and wage payments—annual:	
Officers, superintendents and managers	$158,430
Clerks, stenographers, salesmen, etc.	190,050
Wage earners (including piece workers)	716,493
Total	$1,064,973

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4			2		2
$4 to $4.99	4		10		14
$5 to $5.99	8		3		11
$6 to $6.99	7		11		18
$7 to $7.99	14		7		21
$8 to $8.99	2		2		4
$9 to $9.99	10		2		12
$10 to $10.99	16		3		19
$11 to $11.99	8				8
$12 to $12.99	47				47
$13 to $13.99	43				43
$14 to $14.99	15				15
$15 to $17.99	134		1		135
$18 to $20.99	100				100
$21 to $24.99	316				316
$25 and over	79				79
Totals	803		41		844

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	794		794
February	783		783
March	847		847
April	882		882
May	848		848
June	846		846
July	751		751
August	775		775
September	765		765
October	732		732
November	757		757
December	829		829

TABLE No. 35. EXPLOSIVES.

(5 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	19	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	110	21
Under 18 years of age		
Totals	129	21
Wage earners:		
18 years of age and over	748	57
Under 18 years of age	1	1
Totals	749	58

Salary and wage payments—annual:	
Officers, superintendents and managers	$127,418
Clerks, stenographers, salesmen, etc.	85,000
Wage earners (including piece workers)	576,566
Total	$788,984

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	1				1
$4 to $4.99					
$5 to $5.99	1				1
$6 to $6.99	24				24
$7 to $7.99	1				1
$8 to $8.99	7	35	1		43
$9 to $9.99	5				5
$10 to $10.99	78	5			83
$11 to $11.99	62	1			63
$12 to $12.99	31	1			32
$13 to $13.99	21	5			26
$14 to $14.99	9	2		1	12
$15 to $17.99	200	6			206
$18 to $20.99	143	1			144
$21 to $24.99	97	1			98
$25 and over	68				68
Totals	748	57	1	1	807

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	521	33	554
February	515	31	546
March	532	45	577
April	604	42	646
May	610	43	653
June	671	49	720
July	749	58	807
August	747	55	802
September	765	58	823
October	844	60	904
November	861	62	923
December	932	62	994

TABLE No. 36. FELT AND FELT PRODUCTS.

(3 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	4	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	7	10
Under 18 years of age		
Totals	11	11
Wage earners:		
18 years of age and over	128	30
Under 18 years of age	2	2
Totals	130	32

Salary and wage payments—annual:	
Officers, superintendents and managers	$18,200
Clerks, stenographers, salesmen, etc.	22,724
Wage earners (including piece workers)	106,720
Total	$147,644

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	1	2			3
$4 to $4.99		5			5
$5 to $5.99	4				4
$6 to $6.99	2				2
$7 to $7.99	2	6	1	1	10
$8 to $8.99	4	6	1		11
$9 to $9.99	8	3			11
$10 to $10.99	8	1			9
$11 to $11.99	6	1		1	8
$12 to $12.99	16	2			18
$13 to $13.99	10				10
$14 to $14.99	8	1			9
$15 to $17.99	19	1			20
$18 to $20.99	20	1			21
$21 to $24.99	8	1			9
$25 and over	12				12
Totals	128	30	2	2	162

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	129	8	137
February	164	32	196
March	167	39	206
April	147	53	200
May	160	60	220
June	168	50	218
July	147	40	187
August	159	42	201
September	144	44	188
October	158	42	200
November	140	41	181
December	130	42	172

TABLE No 37. FLOUR MILL AND GRIST MILL PRODUCTS.

(23 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	53	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	148	42
Under 18 years of age	41	10
Totals	242	53
Wage earners:		
18 years of age and over	730	100
Under 18 years of age	12	
Totals	742	100

Salary and wage payments—annual:	
Officers, superintendents and managers	$152,808
Clerks, stenographers, salesmen, etc	228,727
Wage earners (including piece workers)	643,174
Total	$1,024,709

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	10				10
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1	6	2		9
$7 to $7.99		11	4		15
$8 to $8.99		21	3		24
$9 to $9.99	1	35	3		39
$10 to $10.99	5	12			17
$11 to $11.99		2			2
$12 to $12.99	34	8			42
$13 to $13.99	36	3			39
$14 to $14.99	10				10
$15 to $17.99	292	2			294
$18 to $20.99	216				216
$21 to $24.99	98				98
$25 and over	27				27
Totals	730	100	12		842

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	748	98	846
February	716	97	813
March	694	101	795
April	684	106	790
May	680	104	784
June	767	103	870
July	765	99	864
August	749	101	850
September	832	91	923
October	780	92	872
November	778	92	870
December	793	97	890

TABLE No. 38. FOOD PREPARATIONS.

(27 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	36	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	24	4
Under 18 years of age		
Totals	60	4
Wage earners:		
18 years of age and over	142	48
Under 18 years of age	3	
Totals	145	48

Salary and wage payments—annual:	
Officers, superintendents and managers	$58,019
Clerks, stenographers, salesmen, etc.	26,142
Wage earners (including piece workers)	105,602
Total	$189,763

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	1	1			2
$4 to $4.99			1		1
$5 to $5.99		1			1
$6 to $6.99	2	17	1		20
$7 to $7.99	1	5			6
$8 to $8.99		16			16
$9 to $9.99	2	6			8
$10 to $10.99	5		1		6
$11 to $11.99	7				7
$12 to $12.99	21	1			22
$13 to $13.99	21				21
$14 to $14.99	33	1			34
$15 to $17.99	28				28
$18 to $20.99	10				10
$21 to $24.99	6				6
$25 and over	5				5
Totals	142	48	3		193

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	108	49	157
February	110	50	160
March	108	42	150
April	111	41	152
May	111	42	153
June	112	43	155
July	117	39	156
August	123	38	161
September	144	45	189
October	156	44	200
November	152	46	198
December	117	42	159

TABLE No. 39. FOUNDRY AND MACHINE SHOP PRODUCTS.

(119 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	227	3
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	341	94
Under 18 years of age	7	3
Totals	575	100
Wage earners:		
18 years of age and over	2,627	
Under 18 years of age	25	
Totals	2,652	

Salary and wage payments—annual:	
Officers, superintendents and managers	$536,842
Clerks, stenographers, salesmen, etc.	469,016
Wage earners (including piece workers)	2,249,674
Total	$3,255,532

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	33		3		36
$4 to $4.99	16		1		17
$5 to $5.99	19		4		23
$6 to $6.99	37		11		48
$7 to $7.99	27				27
$8 to $8.99	17		2		19
$9 to $9.99	47		4		51
$10 to $10.99	42				42
$11 to $11.99	18				18
$12 to $12.99	81				81
$13 to $13.99	233				233
$14 to $14.99	82				82
$15 to $17.99	422				422
$18 to $20.99	399				399
$21 to $24.99	813				813
$25 and over	341				341
Totals	2,627		25		2,652

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	2,445		2,445
February	2,560		2,560
March	2,640		2,640
April	2,733		2,733
May	2,675		2,675
June	2,518		2,518
July	2,474		2,474
August	2,456		2,456
September	2,513		2,513
October	2,511		2,511
November	2,568		2,568
December	2,697		2,697

TABLE No 40. FURNITURE, BANK AND STORE FIXTURES, ETC.

(43 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	53	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	51	18
Under 18 years of age	2	
Totals	106	19
Wage earners:		
18 years of age and over	740	1
Under 18 years of age	20	
Totals	760	1

Salary and wage payments—annual:	
Officers, superintendents and managers	$102,918
Clerks, stenographers, salesmen, etc	74,133
Wage earners (including piece workers)	654,673
Total	$831,724

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	15		13		28
$7 to $7.99	36		5		41
$8 to $8.99	12	1	2		15
$9 to $9.99	13				13
$10 to $10.99	16				16
$11 to $11.99	3				3
$12 to $12.99	45				45
$13 to $13.99	28				28
$14 to $14.99	19				19
$15 to $17.99	105				105
$18 to $20.99	142				142
$21 to $24.99	164				164
$25 and over	142				142
Totals	740	1	20		761

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	640	1	641
February	773	1	774
March	685	1	686
April	706	1	707
May	704	1	705
June	725	1	726
July	772	1	773
August	816	1	817
September	700	1	701
October	684	1	685
November	747	1	748
December	750	1	751

TABLE No. 41. GAS (in containers).

(7 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	12	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	19	14
Under 18 years of age		
Totals	31	14
Wage earners:		
18 years of age and over	51	
Under 18 years of age		
Totals	51	

Salary and wage payments—annual:	
Officers, superintendents and managers	$22,763
Clerks, stenographers, salesmen, etc.	29,783
Wage earners (including piece workers)	42,224
Total	$94,770

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	2				2
$13 to $13.99	8				8
$14 to $14.99	1				1
$15 to $17.99	23				23
$18 to $20.99	12				12
$21 to $24.99	2				2
$25 and over	3				3
Totals	51				51

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	52		52
February	47		47
March	48		48
April	47		47
May	46		46
June	49		49
July	50		50
August	52		52
September	52		52
October	51		51
November	52		52
December	51		51

TABLE No. 42. GAS AND ELECTRIC FIXTURES.

(14 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	34	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	43	12
Under 18 years of age	1	
Totals	78	12
Wage earners:		
18 years of age and over	138	1
Under 18 years of age	3	
Totals	141	1

Salary and wage payments—annual:	
Officers, superintendents and managers	$72,661
Clerks, stenographers, salesmen, etc.	61,045
Wage earners (including piece workers)	111,804
Total	$245,510

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	5		1		6
$7 to $7.99	4				4
$8 to $8.99	6		1		7
$9 to $9.99	6	1			7
$10 to $10.99	3		1		4
$11 to $11.99	3				3
$12 to $12.99	7				7
$13 to $13.99	2				2
$14 to $14.99	1				1
$15 to $17.99	19				19
$18 to $20.99	23				23
$21 to $24.99	48				48
$25 and over	11				11
Totals	138	1	3		142

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	157	1	158
February	154	1	155
March	141	1	142
April	130		130
May	119		119
June	118		118
July	122		122
August	115		115
September	124	1	125
October	135	1	136
November	145	1	146
December	159	1	160

TABLE No. 43. GLASS, CUTTING AND ORNAMENTING (including mirrors).

(16 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	26	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	57	18
Under 18 years of age		
Totals	83	18
Wage earners:		
18 years of age and over	981	25
Under 18 years of age	10	1
Totals	991	26

Salary and wage payments—annual:	
Officers, superintendents and managers	
Clerks, stenographers, salesmen, etc.	
Wage earners (including piece workers)	
Total	

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99	1		1		2
$5 to $5.99					
$6 to $6.99	3	2		1	6
$7 to $7.99		5	2		7
$8 to $8.99	2				2
$9 to $9.99		9			9
$10 to $10.99	15		7		22
$11 to $11.99	94	4			98
$12 to $12.99	113	4			117
$13 to $13.99	90				90
$14 to $14.99	45				45
$15 to $17.99	90				90
$18 to $20.99	68	1			69
$21 to $24.99	111				111
$25 and over	349				349
Totals	981	25	10	1	1,017

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	664	31	695
February	904	34	938
March	969	25	994
April	794	21	815
May	1,120	25	1,145
June	1,178	32	1,210
July	793	23	816
August	347	17	364
September	849	32	881
October	1,030	35	1,065
November	1,014	33	1,047
December	918	29	947

TABLE No. 44. GLOVES, LEATHER.

(11 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	12	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	11	12
Under 18 years of age	2	1
Totals	25	13
Wage earners:		
18 years of age and over	71	101
Under 18 years of age	5	6
Totals	76	107

Salary and wage payments—annual:	
Officers, superintendents and managers	$23,826
Clerks, stenographers, salesmen, etc.	23,342
Wage earners (including piece workers)	101,603
Total	$148,771

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		1			1
$4 to $4.99		1		1	2
$5 to $5.99	4	6	1	2	13
$6 to $6.99	1	5	1	2	9
$7 to $7.99	1	3	1		5
$8 to $8.99	3	17		1	21
$9 to $9.99	1	17			18
$10 to $10.99	2	17	2		21
$11 to $11.99	2	5			7
$12 to $12.99	7	10			17
$13 to $13.99	9	11			20
$14 to $14.99	4	2			6
$15 to $17.99	11	5			16
$18 to $20.99	19	1			20
$21 to $24.99	3				3
$25 and over	4				4
Totals	71	101	5		183

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	75	104	179
February	74	104	178
March	75	104	179
April	75	102	177
May	73	104	177
June	74	104	178
July	73	102	175
August	73	107	180
September	74	105	179
October	75	105	180
November	74	106	180
December	76	107	183

TABLE No. 45. GLUE AND TALLOW.

(7 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	15	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	9	3
Under 18 years of age		
Totals	24	3
Wage earners:		
18 years of age and over	135	2
Under 18 years of age		
Totals	135	2

Salary and wage payments—annual:	
Officers, superintendents and managers	$28,260
Clerks, stenographers, salesmen, etc.	20,868
Wage earners (including piece workers)	116,201
Total	$165,329

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99		1			1
$8 to $8.99					
$9 to $9.99	2				2
$10 to $10.99	11	1			12
$11 to $11.99	1				1
$12 to $12.99	5				5
$13 to $13.99	16				16
$14 to $14.99	30				30
$15 to $17.99	36				36
$18 to $20.99	8				8
$21 to $24.99	14				14
$25 and over	12				12
Totals	135	2			137

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	116	1	117
February	125	1	126
March	129	2	131
April	131	2	133
May	124	2	126
June	117	2	119
July	122	1	123
August	126	1	127
September	144	1	145
October	159	1	160
November	147	2	149
December	147	2	149

TABLE No. 46. HATS AND CAPS, MEN'S.

(6 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	9	2
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	7	5
Under 18 years of age		
Totals	16	7
Wage earners:		
18 years of age and over	41	34
Under 18 years of age	2	1
Totals	43	35

Salary and wage payments—annual:	
Officers, superintendents and managers	$20,505
Clerks, stenographers, salesmen, etc	12,809
Wage earners (including piece workers)	46,530
Total	$79,844

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		1			1
$4 to $4.99		1			1
$5 to $5.99					
$6 to $6.99		2	1		3
$7 to $7.99	2	1	1	1	5
$8 to $8.99		5			5
$9 to $9.99	1	12			13
$10 to $10.99	2	4			6
$11 to $11.99		1			1
$12 to $12.99		3			3
$13 to $13.99					
$14 to $14.99		1			1
$15 to $17.99	5	3			8
$18 to $20.99	4				4
$21 to $24.99	18				18
$25 and over	9				9
Totals	41	34	2	1	78

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	37	28	65
February	41	33	74
March	41	39	80
April	38	34	72
May	37	32	69
June	36	30	66
July	37	31	68
August	40	31	71
September	40	38	78
October	47	35	82
November	45	36	81
December	46	34	80

TABLE No. 47. ICE, MANUFACTURED.

(47 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	74	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	57	15
Under 18 years of age		
Totals	131	15
Wage earners:		
18 years of age and over	698	
Under 18 years of age		
Totals	698	

Salary and wage payments—annual:	
Officers, superintendents and managers	$161,284
Clerks, stenographers, salesmen, etc.	83,736
Wage earners (including piece workers)	666,112
Total	$911,132

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	1				1
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99	1				1
$12 to $12.99	13				13
$13 to $13.99	6				6
$14 to $14.99	11				11
$15 to $17.99	232				232
$18 to $20.99	167				167
$21 to $24.99	156				156
$25 and over	111				111
Totals	698				698

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	584		584
February	596		596
March	656		656
April	742		742
May	742		742
June	814		814
July	859		859
August	906		906
September	859		859
October	732		732
November	642		642
December	590		590

TABLE No. 48. IRON AND STEEL FORGINGS, BOLTS AND NUTS.

(7 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	17	----------
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	27	7
Under 18 years of age	----------	----------
Totals	44	7
Wage earners:		
18 years of age and over	537	----------
Under 18 years of age	10	----------
Totals	547	----------

Salary and wage payments—annual:	
Officers, superintendents and managers	$45,900
Clerks, stenographers, salesmen, etc.	39,308
Wage earners (including piece workers)	470,234
Total	$555,442

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	----------	----------	----------	----------	----------
$4 to $4.99	----------	----------	----------	----------	----------
$5 to $5.99	----------	----------	----------	----------	----------
$6 to $6.99	----------	----------	8	----------	8
$7 to $7.99	6	----------	----------	----------	6
$8 to $8.99	6	----------	----------	----------	6
$9 to $9.99	13	----------	1	----------	14
$10 to $10.99	13	----------	1	----------	14
$11 to $11.99	1	----------	----------	----------	1
$12 to $12.99	31	----------	----------	----------	31
$13 to $13.99	89	----------	----------	----------	89
$14 to $14.99	55	----------	----------	----------	55
$15 to $17.99	66	----------	----------	----------	66
$18 to $20.99	69	----------	----------	----------	69
$21 to $24.99	109	----------	----------	----------	109
$25 and over	79	----------	----------	----------	79
Totals	537	----------	10	----------	547

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	466	----------	466
February	484	----------	484
March	461	----------	461
April	468	----------	468
May	487	----------	487
June	492	----------	492
July	510	----------	510
August	547	----------	547
September	577	----------	577
October	578	----------	578
November	611	----------	611
December	566	----------	566

TABLE No. 49. IRON AND STEEL, STRUCTURAL AND ORNAMENTAL.

(32 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	83	2
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	184	35
Under 18 years of age	4	
Totals	271	37
Wage earners:		
18 years of age and over	1,917	
Under 18 years of age	27	
Totals	1,944	

Salary and wage payments—annual:	
Officers, superintendents and managers	$211,725
Clerks, stenographers, salesmen, etc.	217,210
Wage earners (including piece workers)	1,544,324
Total	$1,973,259

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99			1		1
$5 to $5.99	1		5		6
$6 to $6.99	3		7		10
$7 to $7.99	8		4		12
$8 to $8.99	3		2		5
$9 to $9.99	12		3		15
$10 to $10.99	16		4		20
$11 to $11.99	28		1		29
$12 to $12.99	402				402
$13 to $13.99	141				141
$14 to $14.99	148				148
$15 to $17.99	355				355
$18 to $20.99	351				351
$21 to $24.99	244				244
$25 and over	205				205
Totals	1,917		27		1,944

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	2,058		2,058
February	1,915		1,915
March	1,730		1,730
April	1,905		1,905
May	2,102		2,102
June	2,128		2,128
July	2,010		2,010
August	2,145		2,145
September	1,948		1,948
October	1,780		1,780
November	1,810		1,810
December	2,036		2,036

TABLE No. 50. JEWELRY.

(18 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	10	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	19	11
Under 18 years of age	3	1
Totals	32	12
Wage earners:		
18 years of age and over	332	47
Under 18 years of age	25	8
Totals	357	55

Salary and wage payments—annual:	
Officers, superintendents and managers	$16,900
Clerks, stenographers, salesmen, etc.	20,828
Wage earners (including piece workers)	357,085
Total	$394,813

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	2	8	17		27
$6 to $6.99	5	7	3	4	19
$7 to $7.99	5	3	2	4	14
$8 to $8.99	3	2	1		6
$9 to $9.99	19	11			30
$10 to $10.99	14	3			17
$11 to $11.99	2	1			3
$12 to $12.99	15	3			18
$13 to $13.99	9	1			10
$14 to $14.99	8	2			10
$15 to $17.99	39	3	2		44
$18 to $20.99	49	2			51
$21 to $24.99	69	1			70
$25 and over	93				93
Totals	332	47	25	8	412

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	349	55	404
February	355	45	400
March	358	49	407
April	361	49	410
May	354	45	399
June	345	48	393
July	342	44	386
August	354	48	402
September	370	48	418
October	370	57	427
November	375	62	437
December	372	66	438

TABLE No. 51. KNIT GOODS.

(10 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	19	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	46	28
Under 18 years of age	8	
Totals	73	28
Wage earners:		
18 years of age and over	76	342
Under 18 years of age	3	23
Totals	79	365

Salary and wage payments—annual:	
Officers, superintendents and managers	$559,534
Clerks, stenographers, salesmen, etc.	65,361
Wage earners (including piece workers)	205,777
Total	$330,672

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99		8			8
$5 to $5.99	1	8		4	13
$6 to $6.99	3	23	2	4	32
$7 to $7.99		64	1	8	73
$8 to $8.99	2	49		4	55
$9 to $9.99	1	52		1	54
$10 to $10.99	7	35		2	44
$11 to $11.99	4	22			26
$12 to $12.99	8	29			37
$13 to $13.99	1	12			13
$14 to $14.99	4	8			12
$15 to $17.99	13	26			39
$18 to $20.99	11	3			14
$21 to $24.99	10	1			11
$25 and over	11	2			13
Totals	76	342	3	23	444

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	69	292	361
February	72	322	394
March	75	340	415
April	79	364	443
May	75	362	437
June	76	361	437
July	79	353	432
August	80	382	462
September	78	380	458
October	75	386	461
November	85	405	490
December	86	378	464

TABLE No. 52. LAUNDRIES (Steam).

(98 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	172	9
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	422	342
Under 18 years of age	1	
Totals	595	351
Wage earners:		
18 years of age and over	2,042	3,753
Under 18 years of age	4	23
Totals	2,046	3,776

Salary and wage payments—annual:	
Officers, superintendents and managers	$354,836
Clerks, stenographers, salesmen, etc.	631,599
Wage earners (including piece workers)	3,332,677
Total	$4,319,112

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		1			1
$4 to $4.99		15			15
$5 to $5.99	1	42			43
$6 to $6.99	12	163		4	179
$7 to $7.99	68	717	3	8	796
$8 to $8.99	76	916	1	7	1,000
$9 to $9.99	101	722		4	827
$10 to $10.99	110	431			541
$11 to $11.99	48	206			254
$12 to $12.99	172	273			445
$13 to $13.99	66	67			133
$14 to $14.99	78	33			111
$15 to $17.99	422	122			544
$18 to $20.99	560	33			593
$21 to $24.99	161	11			172
$25 and over	167	1			168
Totals	2,042	3,753	4	23	5,822

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	2,008	3,596	5,604
February	1,975	3,619	5,594
March	1,990	3,666	5,656
April	1,985	3,668	5,653
May	1,952	3,593	5,545
June	1,943	3,658	5,601
July	2,040	3,860	5,900
August	2,061	3,856	5,917
September	2,053	3,843	5,896
October	2,042	3,707	5,749
November	2,040	3,724	5,764
December	2,029	3,707	5,736

TABLE No. 53. LEATHER GOODS.

(17 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	26	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	56	14
Under 18 years of age	2	
Totals	84	14
Wage earners:		
18 years of age and over	115	15
Under 18 years of age	4	
Totals	119	15

Salary and wage payments—annual:	
Officers, superintendents and managers	$50,056
Clerks, stenographers, salesmen, etc.	63,373
Wage earners (including piece workers)	104,157
Total	$217,586

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	1	1	1		3
$6 to $6.99		3	1		4
$7 to $7.99	1	2	1		4
$8 to $8.99	1	1	1		3
$9 to $9.99		5			5
$10 to $10.99	5	2			7
$11 to $11.99		1			1
$12 to $12.99	4				4
$13 to $13.99	7				7
$14 to $14.99	6				6
$15 to $17.99	18				18
$18 to $20.99	35				35
$21 to $24.99	30				30
$25 and over	7				7
Totals	115	15	4		134

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	121	15	136
February	120	12	132
March	121	13	134
April	119	11	130
May	122	12	134
June	115	12	127
July	114	12	126
August	111	12	123
September	108	13	121
October	113	11	124
November	118	15	133
December	134	19	153

TABLE No. 54. LIQUORS, DISTILLED.

(7 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	16	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	28	8
Under 18 years of age	3	2
Totals	47	10
Wage earners:		
18 years of age and over	174	1
Under 18 years of age	1	
Totals	175	1

Salary and wage payments—annual:	
Officers, superintendents and managers	$55,810
Clerks, stenographers, salesmen, etc.	53,499
Wage earners (including piece workers)	123,940
Total	$233,249

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1		1		2
$7 to $7.99	3				3
$8 to $8.99					
$9 to $9.99	1				1
$10 to $10.99	4				4
$11 to $11.99	6				6
$12 to $12.99	37	1			38
$13 to $13.99	21				21
$14 to $14.99	1				1
$15 to $17.99	24				24
$18 to $20.99	13				13
$21 to $24.99	55				55
$25 and over	8				8
Totals	174	1	1		176

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	164	1	165
February	155	1	156
March	152	1	153
April	154	1	155
May	152	1	153
June	145	1	146
July	143	1	144
August	143	1	144
September	154	1	155
October	174	1	175
November	183	1	184
December	209	1	210

TABLE No. 55. LIQUORS, MALT.

(36 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	96	4
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	152	17
Under 18 years of age		
Totals	248	21
Wage earners:		
18 years of age and over	1,044	
Under 18 years of age		
Totals	1,044	

Salary and wage payments—annual:	
Officers, superintendents and managers	$359,661
Clerks, stenographers, salesmen, etc.	213,214
Wage earners (including piece workers)	1,204,466
Total	$1,777,341

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99	1				1
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	8				8
$13 to $13.99	1				1
$14 to $14.99	1				1
$15 to $17.99	37				37
$18 to $20.99	264				264
$21 to $24.99	318				318
$25 and over	414				414
Totals	1,044				1,044

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	1,011		1,011
February	1,016		1,016
March	1,023		1,023
April	1,044		1,044
May	1,059		1,059
June	1,085		1,085
July	1,088		1,088
August	1,063		1,063
September	1,071		1,071
October	1,033		1,033
November	1,016		1,016
December	999		999

TABLE No. 56. LIQUORS, VINOUS.

(63 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	71	2
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	61	26
Under 18 years of age		
Totals	130	28
Wage earners:		
18 years of age and over	671	6
Under 18 years of age		
Totals	671	6

Salary and wage payments—annual:	
Officers, superintendents and managers	$204,261
Clerks, stenographers, salesmen, etc.	103,568
Wage earners (including piece workers)	396,522
Total	$704,351

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99		1			1
$6 to $6.99	20				20
$7 to $7.99	2	1			3
$8 to $8.99	5				5
$9 to $9.99	20				20
$10 to $10.99	167				167
$11 to $11.99	23				23
$12 to $12.99	88	2			90
$13 to $13.99	114				114
$14 to $14.99	22				22
$15 to $17.99	120				120
$18 to $20.99	29				29
$21 to $24.99	35	2			37
$25 and over	26				26
Totals	671	6			677

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	622	6	628
February	597	6	603
March	564	6	570
April	510	6	516
May	495	6	501
June	509	6	515
July	485	6	491
August	597	6	603
September	1,239	6	1,245
October	1,331	6	1,337
November	1,077	5	1,082
December	644	5	649

TABLE No. 57. LUMBER INDUSTRY—PLANING MILLS.

(60 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	93	----------
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	132	23
Under 18 years of age	----------	----------
Totals	225	23
Wage earners:		
18 years of age and over	1,548	36
Under 18 years of age	6	4
Totals	1,554	40

Salary and wage payments—annual:	
Officers, superintendents and managers	$190,752
Clerks, stenographers, salesmen, etc.	206,721
Wage earners (including piece workers)	1,332,991
Total	$1,730,464

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	4	----------	----------	----------	4
$4 to $4.99	17	----------	----------	----------	17
$5 to $5.99	2	7	----------	1	10
$6 to $6.99	8	10	----------	1	19
$7 to $7.99	20	11	1	1	33
$8 to $8.99	14	8	1	----------	23
$9 to $9.99	52	----------	1	----------	53
$10 to $10.99	29	----------	3	1	33
$11 to $11.99	22	----------	----------	----------	22
$12 to $12.99	81	----------	----------	----------	81
$13 to $13.99	97	----------	----------	----------	97
$14 to $14.99	22	----------	----------	----------	22
$15 to $17.99	381	----------	----------	----------	381
$18 to $20.99	289	----------	----------	----------	289
$21 to $24.99	297	----------	----------	----------	297
$25 and over	213	----------	----------	----------	213
Totals	1,548	36	6	4	1,594

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	1,473	21	1,494
February	1,435	20	1,455
March	1,485	30	1,515
April	1,532	35	1,567
May	1,429	31	1,460
June	1,477	33	1,510
July	1,453	32	1,485
August	1,510	34	1,544
September	1,559	35	1,594
October	1,549	40	1,589
November	1,553	42	1,595
December	1,562	37	1,599

TABLE No. 58. LUMBER INDUSTRY—SASH AND DOOR MILLS AND HOUSE FINISH.

(48 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	88	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	191	34
Under 18 years of age	4	2
Totals	283	37
Wage earners:		
18 years of age and over	2,150	----------
Under 18 years of age	70	----------
Totals	2,220	----------

Salary and wage payments—annual:	
Officers, superintendents and managers	$223,058
Clerks, stenographers, salesmen, etc.	269,839
Wage earners (including piece workers)	1,899,340
Total	$2,392,237

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	----------	----------	1	----------	1
$4 to $4.99	----------	----------	----------	----------	----------
$5 to $5.99	----------	----------	----------	----------	----------
$6 to $6.99	----------	----------	18	----------	18
$7 to $7.99	18	----------	8	----------	26
$8 to $8.99	11	----------	----------	----------	11
$9 to $9.99	41	----------	9	----------	50
$10 to $10.99	65	----------	22	----------	87
$11 to $11.99	4	----------	----------	----------	4
$12 to $12.99	210	----------	3	----------	213
$13 to $13.99	273	----------	9	----------	282
$14 to $14.99	122	----------	----------	----------	122
$15 to $17.99	351	----------	----------	----------	351
$18 to $20.99	419	----------	----------	----------	419
$21 to $24.99	372	----------	----------	----------	372
$25 and over	264	----------	----------	----------	264
Totals	2,150	----------	70	----------	2,220

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	2,246	----------	2,246
February	2,352	----------	2,352
March	2,328	----------	2,328
April	2,315	----------	2,315
May	2,337	----------	2,337
June	2,396	----------	2,396
July	2,291	----------	2,291
August	2,216	----------	2,216
September	2,097	----------	2,097
October	2,138	----------	2,138
November	2,114	----------	2,114
December	2,131	----------	2,131

TABLE No. 59. LUMBER INDUSTRY—SAW MILLS AND LOGGING OPERATIONS.

(33 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	152	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	348	45
Under 18 years of age		
Totals	500	45
Wage earners:		
18 years of age and over	8,896	47
Under 18 years of age	41	
Totals	8,937	47

Salary and wage payments—annual:	
Officers, superintendents and managers	$498,625
Clerks, stenographers, salesmen, etc.	475,762
Wage earners (including piece workers)	6,667,545
Total	$7,641,932

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	1				1
$4 to $4.99		1			1
$5 to $5.99			1		1
$6 to $6.99	8	2	4		14
$7 to $7.99	1	1	4		6
$8 to $8.99	30	2			32
$9 to $9.99	220	6	9		235
$10 to $10.99	296	8	6		310
$11 to $11.99	237	7			244
$12 to $12.99	1,116	7	13		1,136
$13 to $13.99	1,261	3	3		1,267
$14 to $14.99	322	1			323
$15 to $17.99	2,388	3	1		2,392
$18 to $20.99	1,629				1,629
$21 to $24.99	818	4			822
$25 and over	569	2			571
Totals	8,896	47	41		8,984

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	5,521	32	5,553
February	5,441	29	5,470
March	6,832	33	6,865
April	9,194	42	9,236
May	10,236	50	10,286
June	10,523	52	10,575
July	10,484	51	10,535
August	10,044	50	10,094
September	9,642	48	9,690
October	8,493	42	8,535
November	7,285	38	7,323
December	6,211	30	6,241

TABLE No. 60. LUMBER INDUSTRY—SHINGLE MILLS.

(3 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	2	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over		1
Under 18 years of age		
Totals	2	1
Wage earners:		
18 years of age and over	100	
Under 18 years of age		
Totals	100	

Salary and wage payments—annual:

Officers, superintendents and managers	$2,700
Clerks, stenographers, salesmen, etc.	900
Wage earners (including piece workers)	49,937
Total	$53,537

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1				1
$7 to $7.99					
$8 to $8.99	1				1
$9 to $9.99					
$10 to $10.99	3				3
$11 to $11.99					
$12 to $12.99	3				3
$13 to $13.99	14				14
$14 to $14.99					
$15 to $17.99	52				52
$18 to $20.99	13				13
$21 to $24.99	11				11
$25 and over	2				2
Totals	100				100

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	79		79
February	90		90
March	91		91
April	100		100
May	96		96
June	100		100
July	107		107
August	79		79
September	82		82
October	80		80
November	90		90
December	87		87

TABLE No. 61. MARBLE AND STONE WORK.

(11 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	17	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	16	5
Under 18 years of age		
Totals	33	5
Wage earners:		
18 years of age and over	144	
Under 18 years of age		
Totals	144	

Salary and wage payments—annual:	
Officers, superintendents and managers	$32,808
Clerks, stenographers, salesmen, etc.	16,799
Wage earners (including piece workers)	138,823
Total	$188,430

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99	2				2
$12 to $12.99					
$13 to $13.99	1				1
$14 to $14.99	1				1
$15 to $17.99	26				26
$18 to $20.99	17				17
$21 to $24.99	41				41
$25 and over	56				56
Totals	144				144

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	157		157
February	147		147
March	148		148
April	151		151
May	165		165
June	130		130
July	122		122
August	122		122
September	103		103
October	100		100
November	128		128
December	140		140

TABLE No. 62. MATTRESSES, PILLOWS AND BEDDING.

(22 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	38	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	39	17
Under 18 years of age		1
Totals	77	18
Wage earners:		
18 years of age and over	291	55
Under 18 years of age	8	1
Totals	299	56

Salary and wage payments—annual:	
Officers, superintendents and managers	$74,885
Clerks, stenographers, salesmen, etc.	54,712
Wage earners (including piece workers)	236,235
Total	$365,832

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	1		1		2
$4 to $4.99					
$5 to $5.99	1	3	3		7
$6 to $6.99	7	1	2		10
$7 to $7.99	5	8	1	1	15
$8 to $8.99	8	9			17
$9 to $9.99	9	4	1		14
$10 to $10.99	9	5			14
$11 to $11.99	18	1			19
$12 to $12.99	37	13			50
$13 to $13.99	24	2			26
$14 to $14.99	9	5			14
$15 to $17.99	54	3			57
$18 to $20.99	37	1			38
$21 to $24.99	58				58
$25 and over	14				14
Totals	291	55	8	1	355

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	309	56	365
February	295	55	350
March	302	57	359
April	291	49	340
May	281	53	334
June	290	48	338
July	285	50	335
August	278	49	327
September	283	50	333
October	297	56	353
November	301	53	354
December	294	60	354

TABLE No. 63. METAL SIGNS, STENCILS AND RUBBER STAMPS.

(7 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	20	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	29	3
Under 18 years of age	4	
Totals	53	4
Wage earners:		
18 years of age and over	72	17
Under 18 years of age	1	
Totals	73	17

Salary and wage payments—annual:	
Officers, superintendents and managers	$41,564
Clerks, stenographers, salesmen, etc.	28,335
Wage earners (including piece workers)	61,869
Total	$131,768

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99			1		1
$6 to $6.99		2			2
$7 to $7.99		2			2
$8 to $8.99	1	5			6
$9 to $9.99	1	2			3
$10 to $10.99	2				2
$11 to $11.99	6	2			8
$12 to $12.99	12				12
$13 to $13.99	8	1			9
$14 to $14.99	3				3
$15 to $17.99	14				14
$18 to $20.99	13	3			16
$21 to $24.99	8				8
$25 and over	4				4
Totals	72	17	1		90

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	64	14	78
February	60	11	71
March	59	9	68
April	61	9	70
May	62	13	75
June	58	15	73
July	58	10	68
August	59	11	70
September	73	17	90
October	109	36	145
November	120	38	158
December	105	45	150

TABLE No. 64. MILLINERY.

(11 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	13	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	13	19
Under 18 years of age	3	
Totals	29	20
Wage earners:		
18 years of age and over	42	128
Under 18 years of age	1	9
Totals	43	137

Salary and wage payments—annual:	
Officers, superintendents and managers	$28,815
Clerks, stenographers, salesmen, etc.	26,994
Wage earners (including piece workers)	99,694
Total	$155,503

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		1		3	4
$4 to $4.99					
$5 to $5.99		1		3	4
$6 to $6.99	2	17	1	2	22
$7 to $7.99	2	7		1	10
$8 to $8.99		11			11
$9 to $9.99	1	7			8
$10 to $10.99	1	24			25
$11 to $11.99		9			9
$12 to $12.99	2	13			15
$13 to $13.99	2	3			5
$14 to $14.99	1	3			4
$15 to $17.99	12	18			30
$18 to $20.99	6	5			11
$21 to $24.99	5	1			6
$25 and over	10	8			18
Totals	42	128	1	9	180

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	41	114	155
February	42	145	187
March	51	170	221
April	44	133	177
May	34	105	139
June	35	108	143
July	39	114	153
August	53	158	211
September	57	164	221
October	50	156	206
November	45	119	164
December	38	123	161

TABLE No. 65. OIL STOVES AND OIL BURNING EQUIPMENT.

(10 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	10	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	13	8
Under 18 years of age		
Totals	23	9
Wage earners:		
18 years of age and over	96	
Under 18 years of age	2	
Totals	98	

Salary and wage payments—annual:	
Officers, superintendents and managers	$22,816
Clerks, stenographers, salesmen, etc.	17,194
Wage earners (including piece workers)	86,521
Total	$126,531

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99			1		1
$6 to $6.99	1				1
$7 to $7.99			1		1
$8 to $8.99	2				2
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	2				2
$13 to $13.99	1				1
$14 to $14.99	1				1
$15 to $17.99	11				11
$18 to $20.99	21				21
$21 to $24.99	50				50
$25 and over	7				7
Totals	96		2		98

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	96		96
February	90		90
March	88		88
April	79		79
May	78		78
June	78		78
July	84		84
August	84		84
September	95		95
October	96		96
November	97		97
December	89		89

TABLE No. 66. OIL WELL TOOLS AND SUPPLIES.

(9 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	19	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	13	10
Under 18 years of age		
Totals	32	10
Wage earners:		
18 years of age and over	164	
Under 18 years of age		
Totals	164	

Salary and wage payments—annual:	
Officers, superintendents and managers	$37,156
Clerks, stenographers, salesmen, etc.	24,697
Wage earners (including piece workers)	118,763
Total	$180,616

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	2				2
$7 to $7.99					
$8 to $8.99	5				5
$9 to $9.99	2				2
$10 to $10.99	4				4
$11 to $11.99	1				1
$12 to $12.99	8				8
$13 to $13.99	13				13
$14 to $14.99	18				18
$15 to $17.99	29				29
$18 to $20.99	25				25
$21 to $24.99	35				35
$25 and over	22				22
Totals	164				164

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	151		151
February	145		145
March	171		171
April	168		168
May	162		162
June	184		184
July	166		166
August	173		173
September	173		173
October	172		172
November	165		165
December	165		165

TABLE No. 67. PACKING AND PROCESSING OF DRIED FRUITS.

(77 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	100	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	131	47
Under 18 years of age	5	1
Totals	236	48
Wage earners:		
18 years of age and over	2,261	2,388
Under 18 years of age	17	11
Totals	2,278	2,399

Salary and wage payments—annual:	
Officers, superintendents and managers	$287,194
Clerks, stenographers, salesmen, etc.	142,069
Wage earners (including piece workers)	1,270,115
Total	$1,699,378

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	133	161			294
$4 to $4.99	39	58			97
$5 to $5.99	59	84		1	144
$6 to $6.99	53	163	8	2	226
$7 to $7.99	75	279	1	2	457
$8 to $8.99	54	238	2		294
$9 to $9.99	108	537	4		649
$10 to $10.99	116	250	2	5	373
$11 to $11.99	83	107			190
$12 to $12.99	427	118			545
$13 to $13.99	178	66			244
$14 to $14.99	223	62		1	286
$15 to $17.99	509	106			615
$18 to $20.99	115	57			172
$21 to $24.99	57	2			59
$25 and over	32				32
Totals	2,261	2,388	17	11	4,677

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	872	667	1,539
February	716	662	1,378
March	562	547	1,109
April	515	525	1,040
May	567	430	997
June	734	492	1,226
July	1,005	732	1,737
August	1,294	1,178	2,472
September	2,202	1,932	4,134
October	3,335	2,888	6,223
November	2,940	2,362	5,302
December	1,651	1,413	3,064

TABLE No. 68. PAINTS AND VARNISHES.

(22 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	44	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	68	21
Under 18 years of age		
Totals	112	21
Wage earners:		
18 years of age and over	353	24
Under 18 years of age	2	3
Totals	355	27

Salary and wage payments—annual:	
Officers, superintendents and managers	$101,399
Clerks, stenographers, salesmen, etc.	112,790
Wage earners (including piece workers)	336,243
Total	$550,432

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99	1		1		2
$5 to $5.99			1		1
$6 to $6.99				1	1
$7 to $7.99	1	10		1	12
$8 to $8.99		1			1
$9 to $9.99	18	4		1	23
$10 to $10.99	7	3			10
$11 to $11.99	2				2
$12 to $12.99	14	1			15
$13 to $13.99	48	3			51
$14 to $14.99					
$15 to $17.99	157	1			158
$18 to $20.99	56				56
$21 to $24.99	32	1			33
$25 and over	17				17
Totals	353	24	2	3	382

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	362	27	389
February	374	27	401
March	373	27	400
April	351	32	383
May	388	39	427
June	371	39	410
July	374	37	411
August	372	34	406
September	380	33	413
October	380	29	409
November	357	29	386
December	355	27	382

TABLE No. 69. PAPER AND PAPER GOODS (not elsewhere specified).

(8 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	22	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	19	29
Under 18 years of age		
Totals	41	29
Wage earners:		
18 years of age and over	326	106
Under 18 years of age	5	20
Totals	331	126

Salary and wage payments—annual:	
Officers, superintendents and managers	$58,140
Clerks, stenographers, salesmen, etc.	55,971
Wage earners (including piece workers)	285,675
Total	$399,786

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99		2	1	9	12
$6 to $6.99		36	2	9	47
$7 to $7.99		25	1	1	27
$8 to $8.99	1	24		1	26
$9 to $9.99	9	9			18
$10 to $10.99	11	1	1		13
$11 to $11.99		2			2
$12 to $12.99	60	2			62
$13 to $13.99	68	3			71
$14 to $14.99	35	1			36
$15 to $17.99	59	1			60
$18 to $20.99	48				48
$21 to $24.99	27				27
$25 and over	8				8
Totals	326	106	5	20	457

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	270	84	354
February	296	87	383
March	290	93	383
April	324	98	422
May	305	100	405
June	300	96	396
July	298	97	395
August	301	99	400
September	302	116	418
October	302	116	418
November	319	126	445
December	334	126	460

TABLE No. 70. PATENT MEDICINES, COMPOUNDS AND DRUGGISTS' PREPARATIONS.

(15 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	22	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	51	40
Under 18 years of age		
Totals	73	41
Wage earners:		
18 years of age and over	85	92
Under 18 years of age	1	7
Totals	86	99

Salary and wage payments—annual:	
Officers, superintendents and managers	$49,304
Clerks, stenographers, salesmen, etc.	52,750
Wage earners (including piece workers)	59,241
Total	$161,295

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		1			1
$4 to $4.99					
$5 to $5.99		1			1
$6 to $6.99	1	5		7	13
$7 to $7.99	5	17			22
$8 to $8.99	7	9			16
$9 to $9.99	5	14			19
$10 to $10.99	9	12			21
$11 to $11.99	2	11			13
$12 to $12.99	13	10	1		24
$13 to $13.99	5	5			10
$14 to $14.99	4	4			8
$15 to $17.99	15	2			17
$18 to $20.99	7	1			8
$21 to $24.99	4				4
$25 and over	8				8
Totals	85	92	1	7	185

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	73	90	163
February	73	89	162
March	76	96	172
April	76	94	170
May	76	122	198
June	84	116	200
July	84	138	222
August	83	132	215
September	79	130	209
October	86	138	224
November	85	128	213
December	81	126	207

TABLE No. 71. PETROLEUM REFINING.

(15 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	139	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	1,296	185
Under 18 years of age	71	
Totals	1,506	185
Wage earners:		
18 years of age and over	5,639	40
Under 18 years of age	34	
Totals	5,673	40

Salary and wage payments—annual:	
Officers, superintendents and managers	$630,531
Clerks, stenographers, salesmen, etc.	1,844,065
Wage earners (including piece workers)	5,920,576
Total	$8,395,172

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99	2				2
$5 to $5.99	1				1
$6 to $6.99					
$7 to $7.99	15		1		16
$8 to $8.99	21		1		22
$9 to $9.99	27		5		32
$10 to $10.99	21		2		23
$11 to $11.99	37		12		49
$12 to $12.99	128		13		141
$13 to $13.99	165				165
$14 to $14.99	53				53
$15 to $17.99	1,779	39			1,818
$18 to $20.99	1,098				1,098
$21 to $24.99	1,427				1,427
$25 and over	865	1			866
Totals	5,639	40	34		5,713

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	5,622	41	5,663
February	5,558	38	5,596
March	5,560	37	5,597
April	5,498	37	5,535
May	5,382	32	5,414
June	5,601	32	5,633
July	5,583	34	5,617
August	5,526	37	5,563
September	5,672	35	5,707
October	5,846	37	5,883
November	5,793	30	5,823
December	5,732	40	5,772

TABLE No. 72. PHOTO ENGRAVING, ELECTROTYPING AND STEREOTYPING.

(29 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	47	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	75	31
Under 18 years of age	3	
Totals	125	31
Wage earners:		
18 years of age and over	490	53
Under 18 years of age	31	32
Totals	521	85

Salary and wage payments—annual:	
Officers, superintendents and managers	----------
Clerks, stenographers, salesmen, etc.	----------
Wage earners (including piece workers)	----------
Total	----------

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	1		2		3
$6 to $6.99	9	17	14	17	57
$7 to $7.99	1	8	10	10	29
$8 to $8.99	41	7	5	4	57
$9 to $9.99	24	6			30
$10 to $10.99	35	5			40
$11 to $11.99	17	2		1	20
$12 to $12.99	23				23
$13 to $13.99	20	1			21
$14 to $14.99	13	2			15
$15 to $17.99	42	2			44
$18 to $20.99	36	2			38
$21 to $24.99	56				56
$25 and over	172	1			173
Totals	490	53	31	32	606

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	474	75	549
February	498	71	569
March	485	69	554
April	484	67	551
May	470	63	533
June	469	63	532
July	468	65	533
August	483	69	552
September	506	73	579
October	537	76	613
November	530	77	607
December	518	85	603

TABLE No. 73. PRINTING AND PUBLISHING.

(246 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	380	11
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	1,615	347
Under 18 years of age	149	4
Totals	2,144	362
Wage earners:		
18 years of age and over	3,160	625
Under 18 years of age	345	25
Totals	3,505	650

Salary and wage payments—annual:	
Officers, superintendents and managers	$913,922
Clerks, stenographers, salesmen, etc.	1,756,973
Wage earners (including piece workers)	3,605,033
Total	$6,275,928

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	16	8	228		252
$4 to $4.99	20	1	13	1	35
$5 to $5.99	27	10	19	11	67
$6 to $6.99	57	27	29	8	121
$7 to $7.99	47	27	26	3	103
$8 to $8.99	57	45	17		119
$9 to $9.99	66	90	7	2	165
$10 to $10.99	78	176	2		256
$11 to $11.99	20	53			73
$12 to $12.99	110	62	4		176
$13 to $13.99	78	16			94
$14 to $14.99	57	14			71
$15 to $17.99	323	41			364
$18 to $20.99	301	21			322
$21 to $24.99	570	13			583
$25 and over	1,333	21			1,354
Totals	3,160	625	345	25	4,155

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	3,521	635	4,156
February	3,525	636	4,161
March	3,528	674	4,202
April	3,498	631	4,129
May	3,567	632	4,199
June	3,511	660	4,171
July	3,504	637	4,141
August	3,456	618	4,074
September	3,453	618	4,071
October	3,532	644	4,176
November	3,522	663	4,185
December	3,569	651	4,220

TABLE No. 74. ROCK, QUARRYING AND CRUSHING.

(13 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	21	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	15	3
Under 18 years of age		
Totals	36	3
Wage earners:		
18 years of age and over	285	
Under 18 years of age	1	
Totals	286	

Salary and wage payments—annual:	
Officers, superintendents and managers	$46,283
Clerks, stenographers, salesmen, etc.	17,928
Wage earners (including piece workers)	271,219
Total	$335,430

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4			1		1
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	20				20
$13 to $13.99	66				66
$14 to $14.99	10				10
$15 to $17.99	90				90
$18 to $20.99	48				48
$21 to $24.99	27				27
$25 and over	24				24
Totals	285		1		286

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	243		243
February	273		273
March	260		260
April	274		274
May	235		235
June	288		288
July	269		269
August	234		234
September	332		332
October	308		308
November	333		333
December	290		290

TABLE No. 75. ROOFING MATERIALS AND BUILDING PAPER.

(6 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	32	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	97	18
Under 18 years of age	1	
Totals	130	18
Wage earners:		
18 years of age and over	332	3
Under 18 years of age		
Totals	332	3

Salary and wage payments—annual:	
Officers, superintendents and managers	$116,303
Clerks, stenographers, salesmen, etc.	137,998
Wage earners (including piece workers)	236,934
Total	$491,235

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99	1				1
$9 to $9.99	10	1			11
$10 to $10.99	25	1			26
$11 to $11.99	6				6
$12 to $12.99	43				43
$13 to $13.99	44				44
$14 to $14.99					
$15 to $17.99	92				92
$18 to $20.99	79				79
$21 to $24.99	29	1			30
$25 and over	3				3
Totals	332	3			335

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	307	3	310
February	313	3	316
March	300	3	303
April	305	3	308
May	286	2	288
June	272	2	274
July	249	2	251
August	282	2	284
September	296	3	299
October	326	3	329
November	331	3	344
December	342	3	345

TABLE No. 76. RUBBER GOODS, MECHANICAL AND RUBBER SPECIALTIES.

(9 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	8	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	17	15
Under 18 years of age		
Totals	25	15
Wage earners:		
18 years of age and over	116	15
Under 18 years of age		
Totals	116	15

Salary and wage payments—annual:	
Officers, superintendents and managers	$9,025
Clerks, stenographers, salesmen, etc.	19,827
Wage earners (including piece workers)	107,003
Total	$135,855

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99		3			3
$6 to $6.99		1			1
$7 to $7.99	1	3			4
$8 to $8.99	3	2			5
$9 to $9.99	7	1			8
$10 to $10.99	2				2
$11 to $11.99	7				7
$12 to $12.99	14	2			16
$13 to $13.99	4	1			5
$14 to $14.99	11				11
$15 to $17.99	28	2			30
$18 to $20.99	20				20
$21 to $24.99	14				14
$25 and over	5				5
Totals	116	15			131

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	114	17	131
February	115	17	132
March	119	17	136
April	118	17	135
May	118	17	135
June	125	16	141
July	122	15	137
August	107	9	116
September	111	15	126
October	113	16	129
November	113	16	129
December	100	13	113

TABLE No. 77. SALT.

(7 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	17	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	12	8
Under 18 years of age		
Totals	29	8
Wage earners:		
18 years of age and over	179	15
Under 18 years of age		6
Totals	179	21

Salary and wage payments—annual:	
Officers, superintendents and managers	$38,500
Clerks, stenographers, salesmen, etc.	26,179
Wage earners (including piece workers)	181,188
Total	$245,867

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	1				1
$4 to $4.99	1				1
$5 to $5.99	1				1
$6 to $6.99	2				2
$7 to $7.99		10		6	16
$8 to $8.99	2				2
$9 to $9.99	1	2			3
$10 to $10.99		2			2
$11 to $11.99	20				20
$12 to $12.99	37	1			38
$13 to $13.99	32				32
$14 to $14.99					
$15 to $17.99	53				53
$18 to $20.99	12				12
$21 to $24.99	12				12
$25 and over	5				5
Totals	179	15		6	200

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	153	19	172
February	152	19	171
March	159	17	176
April	149	19	168
May	158	17	175
June	158	22	180
July	160	26	186
August	204	20	224
September	208	20	228
October	211	20	231
November	215	23	238
December	178	21	199

TABLE No. 78. SHEET METAL PRODUCTS (not including tin cans).

(44 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	61	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	94	26
Under 18 years of age	2	1
Totals	157	27
Wage earners:		
18 years of age and over	601	9
Under 18 years of age	9	
Totals	610	9

Salary and wage payments—annual:	
Officers, superintendents and managers	$176,897
Clerks, stenographers, salesmen, etc	105,357
Wage earners (including piece workers)	500,280
Total	$782,534

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4			2		2
$4 to $4.99					
$5 to $5.99	1		2		3
$6 to $6.99	3		1		4
$7 to $7.99	2	5	1		8
$8 to $8.99	1	1			2
$9 to $9.99	8	1	1		10
$10 to $10.99	7	2			9
$11 to $11.99	5		2		7
$12 to $12.99	40				40
$13 to $13.99	83				83
$14 to $14.99	40				40
$15 to $17.99	110				110
$18 to $20.99	72				72
$21 to $24.99	97				97
$25 and over	132				132
Totals	601	9	9		619

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	561	2	563
February	568	2	570
March	562	5	567
April	539	13	552
May	528	5	533
June	551	4	555
July	568	4	572
August	600	4	604
September	602	3	605
October	608	3	611
November	589	3	592
December	572	9	581

TABLE No. 79. SHIP BUILDING (including boat building).

(9 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	47	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	78	16
Under 18 years of age		
Totals	125	16
Wage earners:		
18 years of age and over	2,784	
Under 18 years of age	108	
Totals	2,892	

Salary and wage payments—annual:	
Officers, superintendents and managers	$140,018
Clerks, stenographers, salesmen, etc.	98,490
Wage earners (including piece workers)	2,425,811
Total	$2,664,319

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99	8		18		26
$5 to $5.99	20		58		78
$6 to $6.99	22		23		45
$7 to $7.99	109		9		118
$8 to $8.99	10				10
$9 to $9.99	88				88
$10 to $10.99	21				21
$11 to $11.99	265				265
$12 to $12.99	484				484
$13 to $13.99	448				448
$14 to $14.99	254				254
$15 to $17.99	256				256
$18 to $20.99	570				570
$21 to $24.99	196				196
$25 and over	33				33
Totals	2,784		108		2,892

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	2,323		2,323
February	2,284		2,284
March	1,459		1,459
April	2,467		2,467
May	1,573		1,573
June	1,804		1,804
July	2,030		2,030
August	2,873		2,873
September	2,965		2,965
October	2,993		2,993
November	3,120		3,120
December	3,360		3,360

TABLE No. 80. SLAUGHTERING AND MEAT PACKING.

(31 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	84	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	436	30
Under 18 years of age	7	
Totals	527	31
Wage earners:		
18 years of age and over	1,659	57
Under 18 years of age	7	3
Totals	1,666	60

Salary and wage payments—annual:	
Officers, superintendents and managers	$196,121
Clerks, stenographers, salesmen, etc.	524,495
Wage earners (including piece workers)	1,355,540
Total	$2,076,156

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	38				38
$4 to $4.99	9	1			10
$5 to $5.99	1	5			6
$6 to $6.99	5	21	6	1	33
$7 to $7.99	2	21	1		24
$8 to $8.99	10				10
$9 to $9.99	16	3			19
$10 to $10.99	99	1			100
$11 to $11.99	20	1		2	23
$12 to $12.99	349				349
$13 to $13.99	195	4			199
$14 to $14.99	35				35
$15 to $17.99	298				298
$18 to $20.99	330				330
$21 to $24.99	165				165
$25 and over	87				87
Totals	1,659	57	7	3	1,726

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	1,763	54	1,817
February	1,548	51	1,599
March	1,645	43	1,688
April	1,600	59	1,659
May	1,576	58	1,634
June	1,593	56	1,649
July	1,595	45	1,640
August	1,642	48	1,690
September	1,662	78	1,740
October	1,556	59	1,615
November	1,609	51	1,660
December	1,798	52	1,850

TABLE No. 81. SMELTING AND REFINING.

(7 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	12	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	11	5
Under 18 years of age		
Totals	23	5
Wage earners:		
18 years of age and over	179	
Under 18 years of age		
Totals	179	

Salary and wage payments—annual:	
Officers, superintendents and managers	$48,075
Clerks, stenographers, salesmen, etc.	32,764
Wage earners (including piece workers)	115,322
Total	$196,161

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99	34				34
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	21				21
$13 to $13.99	23				23
$14 to $14.99	12				12
$15 to $17.99	40				40
$18 to $20.99	20				20
$21 to $24.99	20				20
$25 and over	9				9
Totals	179				179

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	83		83
February	85		85
March	82		82
April	88		88
May	174		174
June	158		158
July	138		138
August	207		207
September	179		179
October	206		206
November	183		183
December	217		217

TABLE No. 82. SOAP, WASHING POWDER, ETC.

(16 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	26	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	87	17
Under 18 years of age		
Totals	113	17
Wage earners:		
18 years of age and over	355	40
Under 18 years of age	4	1
Totals	359	41

Salary and wage payments—annual:	
Officers, superintendents and managers	$75,768
Clerks, stenographers, salesmen, etc.	132,891
Wage earners (including piece workers)	333,123
Total	$541,782

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99		1			1
$6 to $6.99		6	3		9
$7 to $7.99		3		1	4
$8 to $8.99		1	1		2
$9 to $9.99	1	6			7
$10 to $10.99	2	9			11
$11 to $11.99		8			8
$12 to $12.99	23	2			25
$13 to $13.99	35				35
$14 to $14.99	9	3			12
$15 to $17.99	79	1			80
$18 to $20.99	23				23
$21 to $24.99	153				153
$25 and over	30				30
Totals	355	40	4	1	400

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	358	37	395
February	376	37	413
March	372	39	411
April	379	39	418
May	374	43	417
June	358	41	399
July	361	41	402
August	353	40	393
September	349	43	392
October	330	40	370
November	338	40	378
December	345	39	384

TABLE No. 83. STOVES AND FURNACES (not including oil stoves).

(10 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	17	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	30	5
Under 18 years of age		
Totals	47	6
Wage earners:		
18 years of age and over	298	
Under 18 years of age	8	
Totals	306	

Salary and wage payments—annual:	
Officers, superintendents and managers	$37,689
Clerks, stenographers, salesmen, etc.	41,679
Wage earners (including piece workers)	250,634
Total	$330,002

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	5		5		10
$7 to $7.99			1		1
$8 to $8.99					
$9 to $9.99	5		2		7
$10 to $10.99	8				8
$11 to $11.99					
$12 to $12.99	25				25
$13 to $13.99	7				7
$14 to $14.99	1				1
$15 to $17.99	29				29
$18 to $20.99	48				48
$21 to $24.99	71				71
$25 and over	99				99
Totals	298		8		306

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	292		292
February	276		276
March	282		282
April	271		271
May	274		274
June	284		284
July	280		280
August	270		270
September	256		256
October	297		297
November	319		319
December	315		315

TABLE No. 84. SUGAR REFINING.

(13 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	108	6
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	307	35
Under 18 years of age	3	
Totals	418	41
Wage earners:		
18years of age and over	4,549	78
Under 18 years of age	12	3
Totals	4,561	81

Salary and wage payments—annual:	
Officers, superintendents and managers	$461,659
Clerks, stenographers, salesmen, etc.	372,104
Wage earners (including piece workers)	2,633,477
Total	$3,467,240

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99		30			30
$7 to $7.99	5	1	1		7
$8 to $8.99	2				2
$9 to $9.99	1	19		1	21
$10 to $10.99	14	5	1	2	22
$11 to $11.99	21	1	7		29
$12 to $12.99	143	19	1		163
$13 to $13.99	50	2	2		54
$14 to $14.99	273	1			274
$15 to $17.99	2,025				2,025
$18 to $20.99	845				845
$21 to $24.99	738				738
$25 and over	432				432
Totals	4,549	78	12	3	4,642

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	1,599	34	1,633
February	1,720	46	1,766
March	1,874	52	1,926
April	1,925	55	1,980
May	1,945	59	2,004
June	2,240	65	2,305
July	2,720	66	2,786
August	4,207	64	4,271
September	4,743	77	4,820
October	4,698	88	4,786
November	3,291	75	3,366
December	2,089	66	2,155

TABLE No. 85. TANNING.

(21 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	53	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	41	15
Under 18 years of age	11	
Totals	105	15
Wage earners:		
18 years of age and over	1,084	15
Under 18 years of age	12	2
Totals	1,096	17

Salary and wage payments—annual:	
Officers, superintendents and managers	$139,109
Clerks, stenographers, salesmen, etc.	52,727
Wage earners (including piece workers)	808,940
Total	$1,000,776

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99				1	1
$5 to $5.99					
$6 to $6.99					
$7 to $7.99	3	14	8		25
$8 to $8.99		1	1		2
$9 to $9.99	5		2	1	8
$10 to $10.99	18		1		19
$11 to $11.99	17				17
$12 to $12.99	184				184
$13 to $13.99	288				288
$14 to $14.99	100				100
$15 to $17.99	308				308
$18 to $20.99	78				78
$21 to $24.99	51				51
$25 and over	32				32
Totals	1,084	15	12	2	1,113

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	1,189	16	1,205
February	1,168	15	1,183
March	1,147	3	1,150
April	1,087	16	1,103
May	1,005	11	1,016
June	967	13	980
July	998	11	1,009
August	1,076	4	1,080
September	1,087	9	1,096
October	1,080	14	1,094
November	1,081	15	1,096
December	1,087	16	1,103

TABLE No. 86. TOBACCO MANUFACTURES.

(71 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	36	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	167	47
Under 18 years of age	3	
Totals	206	47
Wage earners:		
18 years of age and over	628	289
Under 18 years of age	13	19
Totals	641	308

Salary and wage payments—annual:	
Officers, superintendents and managers	$76,523
Clerks, stenographers, salesmen, etc.	225,355
Wage earners (including piece workers)	575,041
Total	$876,919

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	1	1	1		3
$4 to $4.99					
$5 to $5.99	13	29	1	1	44
$6 to $6.99	12	42	2	12	68
$7 to $7.99	22	39	1	2	64
$8 to $8.99	17	40	2		59
$9 to $9.99	20	34	4		58
$10 to $10.99	30	41		4	75
$11 to $11.99	13	14			27
$12 to $12.99	33	19	1		53
$13 to $13.99	30	7			37
$14 to $14.99	51	4			55
$15 to $17.99	143	6			149
$18 to $20.99	136	7	1		144
$21 to $24.99	76	4			80
$25 and over	31	2			33
Totals	628	289	13	19	949

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	643	335	978
February	625	311	936
March	644	307	951
April	554	293	847
May	628	307	935
June	639	309	948
July	594	287	881
August	592	292	884
September	607	310	917
October	633	306	939
November	641	317	958
December	613	299	912

TABLE No. 87. TRUNKS, VALISES, ETC.

(9 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	8	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	15	5
Under 18 years of age	10	
Totals	33	5
Wage earners:		
18 years of age and over	103	18
Under 18 years of age	1	1
Totals	104	19

Salary and wage payments—annual:	
Officers, superintendents and managers	$11,130
Clerks, stenographers, salesmen, etc.	26,520
Wage earners (including piece workers)	84,988
Total	$122,638

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	1	1			2
$6 to $6.99	2	1			3
$7 to $7.99	4	2	1		7
$8 to $8.99	1	4			5
$9 to $9.99	2	3			5
$10 to $10.99	3	5			8
$11 to $11.99	2				2
$12 to $12.99	7	1			8
$13 to $13.99	4	1			5
$14 to $14.99	6				6
$15 to $17.99	27				27
$18 to $20.99	31				31
$21 to $24.99	8				8
$25 and over	5				5
Totals	103	18	1		123

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	84	12	96
February	90	13	103
March	89	14	103
April	94	17	111
May	98	18	116
June	95	20	115
July	102	19	121
August	107	22	129
September	109	22	131
October	117	21	138
November	108	21	129
December	104	19	123

TABLE No. 88. WINDOW SHADES.

(11 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	9	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	4	4
Under 18 years of age		
Totals	13	4
Wage earners:		
18 years of age and over	58	11
Under 18 years of age	1	
Totals	59	11

Salary and wage payments—annual:	
Officers, superintendents and managers	$7,830
Clerks, stenographers, salesmen, etc.	9,029
Wage earners (including piece workers)	36,161
Total	$53,020

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1	2			3
$7 to $7.99	1	3			4
$8 to $8.99	1	1			2
$9 to $9.99		3	1		4
$10 to $10.99	1	1			2
$11 to $11.99	2				2
$12 to $12.99	2	1			3
$13 to $13.99	4				4
$14 to $14.99	3				3
$15 to $17.99	12				12
$18 to $20.99	17				17
$21 to $24.99	12				12
$25 and over	2				2
Totals	58	11	1		70

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	54	8	62
February	58	8	66
March	56	9	65
April	57	8	65
May	59	8	67
June	59	10	69
July	60	10	70
August	60	10	70
September	60	10	70
October	60	10	70
November	58	9	67
December	62	9	71

TABLE No. 89. WIRE WORK (including Wire Rope, Netting, etc.).

(12 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	23	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	38	8
Under 18 years of age		
Totals	61	9
Wage earners:		
18 years of age and over	199	
Under 18 years of age		
Totals	199	

Salary and wage payments—annual:	
Officers, superintendents and managers	$49,107
Clerks, stenographers, salesmen, etc.	46,018
Wage earners (including piece workers)	169,111
Total	$264,236

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1				1
$7 to $7.99	13				13
$8 to $8.99	4				4
$9 to $9.99	14				14
$10 to $10.99	10				10
$11 to $11.99	1				1
$12 to $12.99	6				6
$13 to $13.99	22				22
$14 to $14.99	4				4
$15 to $17.99	40				40
$18 to $20.99	41				41
$21 to $24.99	27				27
$25 and over	16				16
Totals	199				199

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	226		226
February	197		197
March	225		225
April	211		211
May	191		191
June	192		192
July	180		180
August	179		179
September	181		181
October	192		192
November	192		192
December	201		201

TABLE No. 90. ALL OTHER INDUSTRIES.*

(74 establishments reporting.)

The State.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	87	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	130	59
Under 18 years of age	1	
Totals	218	59
Wage earners:		
18 years of age and over	887	195
Under 18 years of age	25	24
Totals	912	219

Salary and wage payments—annual:	
Officers, superintendents and managers	$231,362
Clerks, stenographers, salesmen, etc.	272,579
Wage earners (including piece workers)	786,929
Total	$1,290,870

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	3	2	5		10
$4 to $4.99	1	6	4	2	13
$5 to $5.99	7	19	5	2	33
$6 to $6.99	7	22	4	5	38
$7 to $7.99	11	36	5	4	56
$8 to $8.99	15	34		4	53
$9 to $9.99	44	6	1	1	52
$10 to $10.99	40	19		2	61
$11 to $11.99	31	9		2	42
$12 to $12.99	87	24		2	113
$13 to $13.99	61	1	1		63
$14 to $14.99	24	9			33
$15 to $17.99	133	7			140
$18 to $20.99	137	1			138
$21 to $24.99	192				192
$25 and over	94				94
Totals	887	195	25	24	1,131

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	1,129	214	1,343
February	1,152	203	1,355
March	1,157	196	1,353
April	1,173	199	1,372
May	1,175	201	1,376
June	1,168	195	1,363
July	1,160	118	1,278
August	1,199	204	1,403
September	1,221	224	1,445
October	1,245	250	1,495
November	1,249	254	1,503
December	1,271	246	1,517

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*See note on following page.

INDUSTRIES AND NUMBER OF ESTABLISHMENTS INCLUDED IN TABLE No. 90, "ALL OTHER INDUSTRIES."

The State.

Aeroplanes and air craft	1
Beehives and supplies	3
Beds, wall	1
Belting, canvas	1
Boiler compounds, packing, etc.	1
Bottling, beer	1
Cocoanut oil and cake	2
Cordage	1
Cutlery, knives, etc.	1
Display fixtures, wax, etc.	2
Fireworks	1
Flavoring extracts and perfumes	1
Galvanizing and electroplating	3
Gloves, canvas	1
Inks and paste	3
Laboratory supplies	2
Ladders and rolling board partitions	1
Lamps, incandescent	1
Linen goods, table cloths, etc.	1
Metal specialties, etc.	2
Motion picture films, etc.	1
Musical instruments, pianos, etc.	3
Nautical, surveying instruments and supplies	2
Patterns, wood and metal	8
Pennants and novelties	1
Plumbers' supplies, bath tubs, etc.	3
Polish and cleaning fluids	3
Registers and calculating machines	2
Rug weaving	4
Shoddy, wool	1
Sidewalk lights and doors	2
Surgical appliances, etc.	6
Sweeping compounds, etc.	1
Theatrical scenery	1
Toys	1
Tricycles and supplies	1
Typewriter supplies	2
Vending machines	1
Woolen cloth manufacturing	1

TABLE No. 1. ALL INDUSTRIES (TOTAL).

(699 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	1,262	29
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	3,081	979
Under 18 years of age	70	18
Totals	4,413	1,026
Wage earners:		
18 years of age and over	17,388	6,083
Under 18 years of age	382	265
Totals	17,770	6,348

Salary and wage payments—annual:	
Officers, superintendents and managers	$3,528,177
Clerks, stenographers, salesmen, etc.	4,569,332
Wage earners (including piece workers)	17,559,119
Total	$25,656,628

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	6	41	15		62
$4 to $4.99	18	49	39	15	121
$5 to $5.99	80	186	109	48	423
$6 to $6.99	165	709	87	106	1,167
$7 to $7.99	345	759	63	54	1,221
$8 to $8.99	265	964	20	27	1,276
$9 to $9.99	522	954	21	5	1,502
$10 to $10.99	596	806	19	10	1,431
$11 to $11.99	661	446	4		1,111
$12 to $12.99	1,482	482	3		1,967
$13 to $13.99	1,346	196			1,542
$14 to $14.99	810	120			830
$15 to $17.99	2,699	231	2		2,932
$18 to $20.99	2,777	88			2,865
$21 to $24.99	2,785	26			2,811
$25 and over	2,831	26			2,857
Totals	17,388	6,083	382	265	24,118

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	15,916	5,039	20,955
February	16,582	5,196	21,778
March	15,840	5,296	21,136
April	16,400	5,728	22,128
May	15,788	5,572	21,360
June	16,120	5,840	21,966
July	16,035	6,151	22,186
August	16,701	6,382	23,083
September	17,452	6,198	23,650
October	17,760	6,148	23,908
November	17,855	5,778	23,633
December	17,810	5,783	23,593

TABLE No. 3. ARTIFICIAL STONE, CLAY AND CONCRETE PRODUCTS.

(3 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	1	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	1	
Under 18 years of age		
Totals	2	
Wage earners:		
18 years of age and over	13	
Under 18 years of age	1	
Totals	14	

Salary and wage payments—annual:	
Officers, superintendents and managers	$1,000
Clerks, stenographers, salesmen, etc.	490
Wage earners (including piece workers)	18,527
Total	$20,017

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99			1		1
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99					
$13 to $13.99					
$14 to $14.99	2				2
$15 to $17.99	3				3
$18 to $20.99	2				2
$21 to $24.99	1				1
$25 and over	5				5
Totals	13		1		14

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	20		20
February	20		20
March	20		20
April	16		16
May	16		16
June	17		17
July	18		18
August	18		18
September	18		18
October	20		20
November	18		18
December	14		14

TABLE No. 4. AUTOMOBILES (including bodies and parts).

(10 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	18	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	5	9
Under 18 years of age		
Totals	23	10
Wage earners:		
18 years of age and over	124	
Under 18 years of age	1	
Totals	125	

Salary and wage payments—annual:	
Officers, superintendents and managers	$32,829
Clerks, stenographers, salesmen, etc	8,802
Wage earners (including piece workers)	96,766
Total	$138,397

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	2		1		3
$7 to $7.99	5				5
$8 to $8.99	2				2
$9 to $9.99	6				6
$10 to $10.99	3				3
$11 to $11.99					
$12 to $12.99	13				13
$13 to $13.99	2				2
$14 to $14.99					
$15 to $17.99	20				20
$18 to $20.99	24				24
$21 to $24.99	28				28
$25 and over	19				19
Totals	124		1		125

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	101		101
February	111		111
March	112		112
April	118		118
May	121		121
June	113		113
July	117		117
August	114		114
September	119		119
October	118		118
November	127		127
December	128		128

TABLE No. 5. AWNINGS, TENTS AND SAILS.

(5 establishments reporting.)
San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	8	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	3	5
Under 18 years of age		
Totals	11	6
Wage earners:		
18 years of age and over	31	15
Under 18 years of age	1	
Totals	32	15

Salary and wage payments—annual:	
Officers, superintendents and managers	$4,800
Clerks, stenographers, salesmen, etc.	7.474
Wage earners (including piece workers)	36,673
Total	$48,947

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99		1			1
$9 to $9.99	2	4	1		7
$10 to $10.99	1	3			4
$11 to $11.99	1				1
$12 to $12.99	1	6			7
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	4	1			5
$18 to $20.99	3				3
$21 to $24.99	2				2
$25 and over	17				17
Totals	31	15	1		47

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	25	15	40
February	29	16	45
March	27	17	44
April	34	19	53
May	35	19	54
June	32	19	51
July	30	18	48
August	31	19	50
September	33	19	52
October	37	16	53
November	36	17	53
December	31	16	47

TABLE No. 7. BAGS, OTHER THAN PAPER.

(4 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	12	----------
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	28	13
Under 18 years of age	----------	----------
Totals	40	13
Wage earners:		
18 years of age and over	138	220
Under 18 years of age	4	21
Totals	142	241

Salary and wage payments—annual:	
Officers, superintendents and managers	$52,405
Clerks, stenographers, salesmen, etc.	56,342
Wage earners (including piece workers)	205,402
Total	$314,149

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	----------	----------	----------	----------	----------
$4 to $4.99	----------	----------	----------	----------	----------
$5 to $5.99	----------	----------	----------	----------	----------
$6 to $6.99	1	31	1	13	46
$7 to $7.99	4	45	2	5	56
$8 to $8.99	4	34	----------	2	40
$9 to $9.99	4	25	1	1	31
$10 to $10.99	9	49	----------	----------	58
$11 to $11.99	3	12	----------	----------	15
$12 to $12.99	15	11	----------	----------	26
$13 to $13.99	11	9	----------	----------	20
$14 to $14.99	2	1	----------	----------	3
$15 to $17.99	28	2	----------	----------	30
$18 to $20.99	30	----------	----------	----------	30
$21 to $24.99	22	1	----------	----------	23
$25 and over	5	----------	----------	----------	5
Totals	138	220	4	21	383

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	159	137	296
February	144	165	309
March	134	214	348
April	159	295	454
May	152	262	414
June	182	344	526
July	159	320	479
August	161	260	421
September	142	254	396
October	144	247	391
November	125	187	312
December	125	140	265

TABLE No. 8. BAKERY PRODUCTS.

(29 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	47	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	201	29
Under 18 years of age		1
Totals	248	30
Wage earners:		
18 years of age and over	526	357
Under 18 years of age	13	16
Totals	539	373

Salary and wage payments—annual:	
Officers, superintendents and managers	$151,355
Clerks, stenographers, salesmen, etc	245,680
Wage earners (including piece workers)	585,934
Total	$982,969

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99			12	12	24
$5 to $5.99	15	13			28
$6 to $6.99	3	59	1	4	67
$7 to $7.99	41	56			97
$8 to $8.99	18	28			46
$9 to $9.99	17	113			130
$10 to $10.99	29	49			78
$11 to $11.99	14	7			21
$12 to $12.99	24	11			35
$13 to $13.99	15	7			22
$14 to $14.99	13				13
$15 to $17.99	74	12			86
$18 to $20.99	111	2			113
$21 to $24.99	99				99
$25 and over	53				53
Totals	526	357	13	16	912

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	520	368	888
February	522	356	878
March	532	367	899
April	527	365	892
May	517	361	878
June	512	364	876
July	503	356	859
August	526	350	876
September	533	357	890
October	533	370	903
November	539	380	919
December	539	376	915

TABLE No. 10. BASKETS, FRUIT AND BERRY, ETC.

(3 establishments reporting.)
San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers		
Clerks, stenographers, salesmen, etc.:		
18 years of age and over		
Under 18 years of age		
Totals		
Wage earners:		
18 years of age and over	3	3
Under 18 years of age		2
Totals	3	5

Salary and wage payments—annual:	
Officers, superintendents and managers	
Clerks, stenographers, salesmen, etc.	
Wage earners (including piece workers)	$2,925
Total	$2,925

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99		1			1
$6 to $6.99					
$7 to $7.99				2	2
$8 to $8.99		1			1
$9 to $9.99					
$10 to $10.99		1			1
$11 to $11.99					
$12 to $12.99					
$13 to $13.99					
$14 to $14.99	1				1
$15 to $17.99	2				2
$18 to $20.99					
$21 to $24.99					
$25 and over					
Totals	3	3		2	8

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	2	5	7
February	3	5	8
March	4	6	10
April	4	6	10
May	3	7	10
June	3	8	11
July	2	9	11
August	2	9	11
September	2	6	8
October	2	5	7
November	2	4	6
December	2	5	7

TABLE No. 11. BOILERS AND TANKS.

(8 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	16	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	6	4
Under 18 years of age		
Totals	22	4
Wage earners:		
18 years of age and over	121	
Under 18 years of age		
Totals	121	

Salary and wage payments—annual:	
Officers, superintendents and managers	$32,197
Clerks, stenographers, salesmen, etc.	10,537
Wage earners (including piece workers)	124,459
Total	$167,193

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	1				1
$6 to $6.99	1				1
$7 to $7.99	2				2
$8 to $8.99					
$9 to $9.99	4				4
$10 to $10.99	2				2
$11 to $11.99					
$12 to $12.99	2				2
$13 to $13.99					
$14 to $14.99	9				9
$15 to $17.99	25				25
$18 to $20.99	14				14
$21 to $24.99	40				40
$25 and over	21				21
Totals	121				121

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	131		131
February	130		130
March	143		143
April	145		145
May	169		169
June	112		112
July	91		91
August	90		90
September	88		88
October	109		109
November	121		121
December	100		100

TABLE No. 12. BOOTS AND SHOES.

(4 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	9	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	22	11
Under 18 years of age		
Totals	31	11
Wage earners:		
18 years of age and over	216	86
Under 18 years of age	5	
Totals	221	86

Salary and wage payments—annual:	
Officers, superintendents and managers	$22,495
Clerks, stenographers, salesmen, etc.	29,320
Wage earners (including piece workers)	165,558
Total	$217,373

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99		2	1		3
$6 to $6.99	6	11	1		18
$7 to $7.99	5	8	1		14
$8 to $8.99	3	15	1		19
$9 to $9.99	21	7			28
$10 to $10.99	8	13	1		22
$11 to $11.99	5	7			12
$12 to $12.99	13	10			23
$13 to $13.99	16	7			23
$14 to $14.99	6				6
$15 to $17.99	56	4			60
$18 to $20.99	50	2			52
$21 to $24.99	17				17
$25 and over	10				10
Totals	216	86	5		307

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	160	71	231
February	164	66	230
March	163	68	231
April	167	67	234
May	175	70	245
June	170	69	239
July	162	66	228
August	203	79	282
September	205	84	289
October	219	91	310
November	222	90	312
December	221	86	307

TABLE No. 13. BOXES, BAGS, CARTONS, ETC., PAPER.

(9 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	24	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	20	8
Under 18 years of age		
Totals	44	8
Wage earners:		
18 years of age and over	115	168
Under 18 years of age	3	32
Totals	118	200

Salary and wage payments—annual:	
Officers, superintendents and managers	$49,703
Clerks, stenographers, salesmen, etc.	26,684
Wage earners (including piece workers)	127,350
Total	$203,737

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99				1	1
$5 to $5.99		19	1	14	34
$6 to $6.99	2	47	2	6	57
$7 to $7.99	2	37		3	42
$8 to $8.99	1	14		4	19
$9 to $9.99	7	20		2	29
$10 to $10.99	5	18		2	25
$11 to $11.99	1	4			5
$12 to $12.99	21	6			27
$13 to $13.99	8	2			10
$14 to $14.99	4				4
$15 to $17.99	26	1			27
$18 to $20.99	24				24
$21 to $24.99	7				7
$25 and over	7				7
Totals	115	168	3	32	318

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	109	176	285
February	109	172	281
March	108	181	289
April	107	167	274
May	109	161	270
June	107	148	255
July	110	153	263
August	105	171	276
September	112	176	288
October	116	193	309
November	118	200	318
December	117	204	321

TABLE No. 14. BOXES, WOOD.

(5 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	13	-----
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	20	5
Under 18 years of age	-----	-----
Totals	33	5
Wage earners:		
18 years of age and over	259	17
Under 18 years of age	5	-----
Totals	264	17

Salary and wage payments—annual:	
Officers, superintendents and managers	$37,636
Clerks, stenographers, salesmen, etc.	25,141
Wage earners (including piece workers)	177,573
Total	$240,350

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	-----	-----	-----	-----	-----
$4 to $4.99	1	-----	-----	-----	1
$5 to $5.99	-----	-----	1	-----	1
$6 to $6.99	2	1	4	-----	7
$7 to $7.99	6	-----	-----	-----	6
$8 to $8.99	15	2	-----	-----	17
$9 to $9.99	16	7	-----	-----	23
$10 to $10.99	15	3	-----	-----	18
$11 to $11.99	42	2	-----	-----	44
$12 to $12.99	2	1	-----	-----	3
$13 to $13.99	6	-----	-----	-----	6
$14 to $14.99	54	1	-----	-----	55
$15 to $17.99	53	-----	-----	-----	53
$18 to $20.99	20	-----	-----	-----	20
$21 to $24.99	7	-----	-----	-----	7
$25 and over	20	-----	-----	-----	20
Totals	259	17	5	-----	281

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	269	20	289
February	253	20	273
March	259	19	278
April	267	18	285
May	255	18	273
June	256	18	274
July	269	15	284
August	264	16	280
September	272	16	288
October	283	15	298
November	274	15	289
December	271	16	287

TABLE No. 15. BRASS, BRONZE AND COPPER PRODUCTS.

(9 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	17	4
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	14	3
Under 18 years of age	1	
Totals	32	7
Wage earners:		
18 years of age and over	151	
Under 18 years of age		
Totals	151	

Salary and wage payments—annual:	
Officers, superintendents and managers	$42,841
Clerks, stenographers, salesmen, etc.	14,821
Wage earners (including piece workers)	135,773
Total	$193,435

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	1				1
$6 to $6.99	1				1
$7 to $7.99	1				1
$8 to $8.99					
$9 to $9.99	4				4
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	4				4
$13 to $13.99	4				4
$14 to $14.99	1				1
$15 to $17.99	20				20
$18 to $20.99	19				19
$21 to $24.99	53				53
$25 and over	43				43
Totals	151				151

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	130		130
February	140		140
March	137		137
April	145		145
May	135		135
June	131		131
July	136		136
August	135		135
September	132		132
October	131		131
November	164		164
December	151		151

TABLE No. 17. BROOMS AND BRUSHES.

(3 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	1	----------
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	----------	----------
Under 18 years of age	----------	----------
Totals	1	----------
Wage earners:		
18 years of age and over	23	----------
Under 18 years of age	----------	----------
Totals	23	----------

Salary and wage payments—annual:	
Officers, superintendents and managers	$420
Clerks, stenographers, salesmen, etc.	----------
Wage earners (including piece workers)	10,900
Total	$11,320

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	----------	----------	----------	----------	----------
$4 to $4.99	----------	----------	----------	----------	----------
$5 to $5.99	----------	----------	----------	----------	----------
$6 to $6.99	----------	----------	----------	----------	----------
$7 to $7.99	10	----------	----------	----------	10
$8 to $8.99	----------	----------	----------	----------	----------
$9 to $9.99	----------	----------	----------	----------	----------
$10 to $10.99	----------	----------	----------	----------	----------
$11 to $11.99	----------	----------	----------	----------	----------
$12 to $12.99	6	----------	----------	----------	6
$13 to $13.99	2	----------	----------	----------	2
$14 to $14.99	1	----------	----------	----------	1
$15 to $17.99	1	----------	----------	----------	1
$18 to $20.99	2	----------	----------	----------	2
$21 to $24.99	1	----------	----------	----------	1
$25 and over	----------	----------	----------	----------	----------
Totals	23	----------	----------	----------	23

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	23	----------	23
February	23	----------	23
March	23	----------	23
April	23	----------	23
May	23	----------	23
June	23	----------	23
July	23	----------	23
August	23	----------	23
September	23	----------	23
October	23	----------	23
November	23	----------	23
December	23	----------	23

TABLE No. 18. BUTTER, CHEESE AND CONDENSED MILK.

(5 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	15	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	53	22
Under 18 years of age	1	
Totals	69	22
Wage earners:		
18 years of age and over	154	6
Under 18 years of age		
Totals	154	6

Salary and wage payments—annual:	
Officers, superintendents and managers	$32,530
Clerks, stenographers, salesmen, etc.	80,910
Wage earners (including piece workers)	157,584
Total	$271,024

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99		1			1
$9 to $9.99					
$10 to $10.99					
$11 to $11.99		4			4
$12 to $12.99					
$13 to $13.99		1			1
$14 to $14.99					
$15 to $17.99	25				25
$18 to $20.99	33				33
$21 to $24.99	63				63
$25 and over	33				33
Totals	154	6			160

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	151	6	157
February	147	6	153
March	152	6	158
April	153	8	161
May	153	11	164
June	145	8	153
July	143	8	151
August	145	8	153
September	144	8	152
October	145	8	153
November	145	7	152
December	146	7	153

TABLE No. 19. CANS, TIN.

(7 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	11	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	17	11
Under 18 years of age		
Totals	28	11
Wage earners:		
18 years of age and over	784	97
Under 18 years of age	8	4
Totals	792	101

Salary and wage payments—annual:	
Officers, superintendents and managers	$27,837
Clerks, stenographers, salesmen, etc.	24,282
Wage earners (including piece workers)	540,714
Total	$592,833

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	2	1			3
$6 to $6.99	6	13	3	2	24
$7 to $7.99	40	17	4	2	63
$8 to $8.99	24	13			37
$9 to $9.99	89	19	1		109
$10 to $10.99	122	17			139
$11 to $11.99	22	6			28
$12 to $12.99	106	2			108
$13 to $13.99	79	3			82
$14 to $14.99	32	3			35
$15 to $17.99	114	3			117
$18 to $20.99	47				47
$21 to $24.99	69				69
$25 and over	32				32
Totals	784	97	8	4	893

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	585	107	692
February	734	106	840
March	786	107	893
April	783	99	882
May	802	109	911
June	804	108	912
July	763	100	863
August	767	102	869
September	777	103	880
October	686	95	781
November	690	89	779
December	676	89	765

TABLE No. 21. CANNING AND PRESERVING OF FRUITS AND VEGETABLES.

(6 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	34	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	209	35
Under 18 years of age		
Totals	243	36
Wage earners:		
18 years of age and over	410	740
Under 18 years of age	2	19
Totals	412	759

Salary and wage payments—annual:	
Officers, superintendents and managers	$122,688
Clerks, stenographers, salesmen, etc.	309,647
Wage earners (including piece workers)	361,198
Total	$793,533

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		15			15
$4 to $4.99	1	20			21
$5 to $5.99		35		3	38
$6 to $6.99		126		6	132
$7 to $7.99		171	1	8	180
$8 to $8.99	1	71	1	1	74
$9 to $9.99	13	86			99
$10 to $10.99	35	41		1	77
$11 to $11.99	44	59			103
$12 to $12.99	84	54			138
$13 to $13.99	55	26			81
$14 to $14.99	43	18			61
$15 to $17.99	78	15			93
$18 to $20.99	37	3			40
$21 to $24.99	10				10
$25 and over	9				9
Totals	410	740	2	19	1,171

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	166	54	220
February	167	75	242
March	172	46	218
April	216	466	682
May	216	445	661
June	261	584	845
July	416	812	1,228
August	451	959	1,410
September	452	611	1,063
October	408	351	759
November	252	119	371
December	215	198	413

TABLE No. 22. CARBONATED BEVERAGES.

(4 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	3	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	9	1
Under 18 years of age		
Totals	12	1
Wage earners:		
18 years of age and over	9	
Under 18 years of age	2	
Totals	11	

Salary and wage payments—annual:	
Officers, superintendents and managers	$3,760
Clerks, stenographers, salesmen, etc.	11,280
Wage earners (including piece workers)	10,317
Total	$25,357

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99			1		1
$8 to $8.99					
$9 to $9.99					
$10 to $10.99	1				1
$11 to $11.99			1		1
$12 to $12.99					
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	2				2
$18 to $20.99	3				3
$21 to $24.99	2				2
$25 and over	1				1
Totals	9		2		11

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	11		11
February	11		11
March	11		11
April	11		11
May	11		11
June	11		11
July	11		11
August	11		11
September	12		12
October	12		12
November	11		11
December	11		11

TABLE No. 23. CARRIAGES, WAGONS AND MATERIALS.

(3 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	3	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	1	
Under 18 years of age		
Totals	4	
Wage earners:		
18 years of age and over	28	
Under 18 years of age	3	
Totals	31	

Salary and wage payments—annual:	
Officers, superintendents and managers	$5,700
Clerks, stenographers, salesmen, etc.	883
Wage earners (including piece workers)	23,653
Total	$30,236

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99			1		1
$10 to $10.99			1		1
$11 to $11.99			1		1
$12 to $12.99					
$13 to $13.99					
$14 to $14.99	3				3
$15 to $17.99	5				5
$18 to $20.99	10				10
$21 to $24.99	5				5
$25 and over	5				5
Totals	28		3		31

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	28		28
February	31		31
March	34		34
April	35		35
May	34		34
June	31		31
July	30		30
August	30		30
September	32		32
October	32		32
November	27		27
December	24		24

TABLE No. 24. CASKETS AND UNDERTAKERS' SUPPLIES.

(4 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	11	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	14	5
Under 18 years of age		
Totals	25	5
Wage earners:		
18 years of age and over	48	16
Under 18 years of age	1	1
Totals	49	17

Salary and wage payments—annual:	
Officers, superintendents and managers	$22,130
Clerks, stenographers, salesmen, etc.	24,198
Wage earners (including piece workers)	47,240
Totals	$93,568

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99				1	1
$6 to $6.99	1	1			2
$7 to $7.99		1			1
$8 to $8.99		2	1		3
$9 to $9.99	1	5			6
$10 to $10.99	1				1
$11 to $11.99		1			1
$12 to $12.99	2	1			3
$13 to $13.99	2				2
$14 to $14.99	3	1			4
$15 to $17.99	7	2			9
$18 to $20.99	12	1			13
$21 to $24.99	14	1			15
$25 and over	5				5
Totals	48	16	1	1	66

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	49	17	66
February	49	18	67
March	50	15	65
April	52	17	69
May	52	16	68
June	54	15	69
July	49	16	65
August	49	16	65
September	53	16	69
October	54	16	70
November	52	16	68
December	49	16	65

TABLE No. 26. CHEMICALS (including chemical fertilizers).

(6 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	11	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	5	3
Under 18 years of age		
Totals	16	3
Wage earners:		
18 years of age and over	73	
Under 18 years of age		
Totals	73	

Salary and wage payments—annual:	
Officers, superintendents and managers	$20,340
Clerks, stenographers, salesmen, etc.	7,470
Wage earners (including piece workers)	56,680
Total	$84,490

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99	1				1
$10 to $10.99	1				1
$11 to $11.99					
$12 to $12.99	16				16
$13 to $13.99	6				6
$14 to $14.99	26				26
$15 to $17.99	11				11
$18 to $20.99	6				6
$21 to $24.99	5				5
$25 and over	1				1
Totals	73				73

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	72		72
February	72		72
March	77		77
April	70		70
May	66		66
June	71		71
July	65		65
August	65		65
September	68		68
October	68		68
November	66		66
December	72		72

TABLE No. 27. CLOTHING, MEN'S.

(12 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	18	3
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	58	21
Under 18 years of age		
Totals	76	24
Wage earners:		
18 years of age and over	143	757
Under 18 years of age	2	24
Totals	145	781

Salary and wage payments—annual:	
Officers, superintendents and managers	$57,868
Clerks, stenographers, salesmen, etc.	92,242
Wage earners (including piece workers)	435,085
Total	$585,195

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		7			7
$4 to $4.99		10			10
$5 to $5.99		16		5	21
$6 to $6.99	4	34		12	50
$7 to $7.99	2	67	2	3	74
$8 to $8.99	2	95		3	100
$9 to $9.99	6	97			103
$10 to $10.99	8	100		1	109
$11 to $11.99	2	84			86
$12 to $12.99	9	91			100
$13 to $13.99	10	46			56
$14 to $14.99	3	31			34
$15 to $17.99	18	44			62
$18 to $20.99	21	29			50
$21 to $24.99	45	5			50
$25 and over	13	1			14
Totals	143	757	2	24	926

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	125	710	835
February	132	740	872
March	134	733	867
April	132	710	842
May	130	715	845
June	128	722	850
July	138	738	876
August	137	755	892
September	139	751	890
October	140	765	905
November	139	780	919
December	141	782	923

TABLE No. 28. CLOTHING, WOMEN'S.

(14 establishments reporting.)
San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	16	2
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	33	20
Under 18 years of age	4	7
Totals	53	29
Wage earners:		
18 years of age and over	81	240
Under 18 years of age	5	8
Totals	86	248

Salary and wage payments—annual:	
Officers, superintendents and managers	$38,140
Clerks, stenographers, salesmen, etc.	40,004
Wage earners (including piece workers)	149,273
Total	$227,417

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	3	15			18
$4 to $4.99	1	14			15
$5 to $5.99	1	8		1	10
$6 to $6.99	5	22	3	6	36
$7 to $7.99	8	28		1	37
$8 to $8.99	4	29	1		34
$9 to $9.99	2	32			34
$10 to $10.99	14	19	1		34
$11 to $11.99	2	9			11
$12 to $12.99	2	23			25
$13 to $13.99	2	6			8
$14 to $14.99		10			10
$15 to $17.99	3	16			19
$18 to $20.99	7	4			11
$21 to $24.99	7	1			8
$25 and over	20	4			24
Totals	81	240	5	8	334

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	67	201	268
February	74	210	284
March	85	241	326
April	75	232	307
May	69	216	285
June	73	224	297
July	81	232	313
August	80	234	314
September	86	252	338
October	89	258	347
November	82	244	326
December	79	229	308

TABLE No. 29. COFFEE AND SPICE, ROASTING AND GRINDING.

(12 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	40	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	283	113
Under 18 years of age		
Totals	323	113
Wage earners:		
18 years of age and over	163	114
Under 18 years of age	2	1
Totals	165	115

Salary and wage payments—annual:	
Officers, superintendents and managers	$137,492
Clerks, stenographers, salesmen, etc.	470,576
Wage earners (including piece workers)	189,665
Total	$797,733

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	1	1			2
$6 to $6.99	2	16		1	19
$7 to $7.99		26	2		28
$8 to $8.99	3	15			18
$9 to $9.99	4	38			42
$10 to $10.99	12	9			21
$11 to $11.99	10	6			16
$12 to $12.99	6	1			7
$13 to $13.99	6				6
$14 to $14.99	11	1			12
$15 to $17.99	31	1			32
$18 to $20.99	33				33
$21 to $24.99	24				24
$25 and over	20				20
Totals	163	114	2	1	280

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	168	107	275
February	165	106	271
March	170	115	285
April	164	114	278
May	164	112	276
June	167	119	286
July	172	126	298
August	173	119	292
September	165	114	279
October	173	123	296
November	172	121	293
December	160	112	272

TABLE No. 30. CONFECTIONERY.

(14 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	29	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	67	14
Under 18 years of age		
Totals	96	14
Wage earners:		
18 years of age and over	294	489
Under 18 years of age	2	2
Totals	296	491

Salary and wage payments—annual:	
Officers, superintendents and managers	$80,723
Clerks, stenographers, salesmen, etc.	77,087
Wage earners (including piece workers)	323,820
Total	$481,630

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		2			2
$4 to $4.99		1			1
$5 to $5.99	12	52			64
$6 to $6.99	31	156			187
$7 to $7.99	20	82	1	2	105
$8 to $8.99	12	64			76
$9 to $9.99	12	44	1		57
$10 to $10.99	25	38			63
$11 to $11.99	23	11			34
$12 to $12.99	22	24			46
$13 to $13.99	18	7			25
$14 to $14.99	18	1			19
$15 to $17.99	46	6			52
$18 to $20.99	26	1			27
$21 to $24.99	14				14
$25 and over	15				15
Totals	294	489	2	2	787

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	243	325	568
February	260	329	589
March	265	351	616
April	275	349	624
May	268	337	605
June	263	351	614
July	263	331	594
August	274	343	617
September	264	372	636
October	303	451	754
November	319	438	757
December	291	566	857

TABLE No. 31. COOPERAGE AND WOODEN GOODS NOT ELSEWHERE SPECIFIED.

(9 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	19	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	10	5
Under 18 years of age		
Totals	29	5
Wage earners:		
18 years of age and over	141	42
Under 18 years of age	3	
Totals	144	42

Salary and wage payments—annual:	
Officers, superintendents and managers	$31,990
Clerks, stenographers, salesmen, etc.	20,164
Wage earners (including piece workers)	121,897
Total	$174,051

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99		1			1
$7 to $7.99		14			14
$8 to $8.99	1	10			11
$9 to $9.99	2	5			7
$10 to $10.99			1		1
$11 to $11.99		5			5
$12 to $12.99	13	3	2		18
$13 to $13.99	38	2			40
$14 to $14.99	2	2			4
$15 to $17.99	19				19
$18 to $20.99	12				12
$21 to $24.99	46				46
$25 and over	8				8
Totals	141	42	3		186

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	137	47	184
February	139	73	212
March	177	82	259
April	129	104	233
May	121	100	221
June	119	98	217
July	134	112	246
August	124	89	213
September	143	76	219
October	137	74	211
November	137	60	197
December	144	42	186

TABLE No. 32. ELECTRICAL MACHINERY, APPARATUS AND SUPPLIES.

(12 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	22	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	16	17
Under 18 years of age	1	
Totals	39	17
Wage earners:		
18 years of age and over	160	53
Under 18 years of age	11	
Totals	171	53

Salary and wage payments—annual:	
Officers, superintendents and managers	$52,145
Clerks, stenographers, salesmen, etc.	58,317
Wage earners (including piece workers)	129,281
Total	$239,743

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4			1		1
$4 to $4.99			2		2
$5 to $5.99		1	5		6
$6 to $6.99	1	3	2		6
$7 to $7.99	3	19	1		23
$8 to $8.99	17	21			38
$9 to $9.99	11	3			14
$10 to $10.99	11	4			15
$11 to $11.99	21	1			22
$12 to $12.99	18				18
$13 to $13.99	12				12
$14 to $14.99	8	1			9
$15 to $17.99	15				15
$18 to $20.99	10				10
$21 to $24.99	9				9
$25 and over	24				24
Totals	160	53	11		224

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	163	34	197
February	167	34	201
March	162	29	191
April	142	28	170
May	152	26	178
June	149	40	189
July	162	48	210
August	156	39	195
September	167	77	244
October	176	79	255
November	174	57	231
December	169	53	222

TABLE No. 34. ENGINES AND PUMPS—GAS AND GASOLINE, ETC.

(5 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	13	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	6	
Under 18 years of age		
Totals	19	
Wage earners:		
18 years of age and over	75	
Under 18 years of age	9	
Totals	84	

Salary and wage payments—annual:	
Officers, superintendents and managers	$29,690
Clerks, stenographers, salesmen, etc.	12,939
Wage earners (including piece workers)	78,508
Total	$121,137

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99			3		3
$5 to $5.99	2		1		3
$6 to $6.99	1		1		2
$7 to $7.99			2		2
$8 to $8.99	1		1		2
$9 to $9.99					
$10 to $10.99	1		1		2
$11 to $11.99	2				2
$12 to $12.99	3				3
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	8				8
$18 to $20.99	5				5
$21 to $24.99	45				45
$25 and over	7				7
Totals	75		9		84

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	102		102
February	97		97
March	98		98
April	98		98
May	88		88
June	82		82
July	69		69
August	68		68
September	70		70
October	69		69
November	75		75
December	69		69

TABLE No. 37. FLOUR MILL AND GRIST MILL PRODUCTS.

(4 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	11	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	56	15
Under 18 years of age		
Totals	67	16
Wage earners:		
18 years of age and over	123	46
Under 18 years of age		
Totals	123	46

Salary and wage payments—annual:	
Officers, superintendents and managers	$29,455
Clerks, stenographers, salesmen, etc.	71,417
Wage earners (including piece workers)	77,441
Total	$178,313

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99		5			5
$7 to $7.99		3			3
$8 to $8.99		20			20
$9 to $9.99		14			14
$10 to $10.99		2			2
$11 to $11.99					
$12 to $12.99		2			2
$13 to $13.99	7				7
$14 to $14.99	10				10
$15 to $17.99	46				46
$18 to $20.99	44				44
$21 to $24.99	14				14
$25 and over	2				2
Totals	123	46			169

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	123	46	169
February	124	46	170
March	123	46	169
April	118	46	164
May	120	46	166
June	121	46	167
July	123	46	169
August	124	46	170
September	124	46	170
October	127	46	173
November	124	46	170
December	122	46	168

TABLE No. 38. FOOD PREPARATIONS.

(9 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	17	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	14	1
Under 18 years of age		
Totals	31	1
Wage earners:		
18 years of age and over	54	25
Under 18 years of age	1	
Totals	55	25

Salary and wage payments—annual:	
Officers, superintendents and managers	$28,362
Clerks, stenographers, salesmen, etc.	13,722
Wage earners (including piece workers)	50,561
Total	$92,645

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1	5	1		7
$7 to $7.99		4			4
$8 to $8.99		10			10
$9 to $9.99	1	4			5
$10 to $10.99					
$11 to $11.99	3				3
$12 to $12.99	7	1			8
$13 to $13.99	18				18
$14 to $14.99		1			1
$15 to $17.99	14				14
$18 to $20.99	4				4
$21 to $24.99	3				3
$25 and over	3				3
Totals	54	25	1		80

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	53	28	81
February	52	28	80
March	51	21	72
April	50	20	70
May	50	20	70
June	50	20	70
July	50	20	70
August	54	21	75
September	54	27	81
October	55	26	81
November	55	29	84
December	55	25	80

TABLE No. 39. FOUNDRY AND MACHINE SHOP PRODUCTS.

(39 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	76	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	192	57
Under 18 years of age	2	
Totals	270	57
Wage earners:		
18 years of age and over	902	
Under 18 years of age	10	
Totals	912	

Salary and wage payments—annual:	
Officers, superintendents and managers	$221,271
Clerks, stenographers, salesmen, etc.	286,857
Wage earners (including piece workers)	879,834
Total	$1,387,962

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99	2		1		3
$5 to $5.99	4		2		6
$6 to $6.99	6		3		9
$7 to $7.99	5				5
$8 to $8.99	10		1		11
$9 to $9.99	8		3		11
$10 to $10.99	16				16
$11 to $11.99	9				9
$12 to $12.99	34				34
$13 to $13.99	74				74
$14 to $14.99	19				19
$15 to $17.99	99				99
$18 to $20.99	111				111
$21 to $24.99	364				364
$25 and over	141				141
Totals	902		10		912

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	869		869
February	925		925
March	938		938
April	898		898
May	855		855
June	824		824
July	825		825
August	817		817
September	868		868
October	867		867
November	851		851
December	912		912

TABLE No. 40. FURNITURE, BANK AND STORE FIXTURES, ETC.

(19 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	19	----------
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	12	4
Under 18 years of age	1	----------
Totals	32	4
Wage earners:		
18 years of age and over	249	----------
Under 18 years of age	5	----------
Totals	254	----------

Salary and wage payments—annual:	
Officers, superintendents and managers	$47,844
Clerks, stenographers, salesmen, etc.	15,803
Wage earners (including piece workers)	292,943
Total	$356,590

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	----------	----------	----------	----------	----------
$4 to $4.99	----------	----------	----------	----------	----------
$5 to $5.99	----------	----------	----------	----------	----------
$6 to $6.99	----------	----------	3	----------	3
$7 to $7.99	3	----------	1	----------	4
$8 to $8.99	----------	----------	1	----------	1
$9 to $9.99	3	----------	----------	----------	3
$10 to $10.99	6	----------	----------	----------	6
$11 to $11.99	----------	----------	----------	----------	----------
$12 to $12.99	9	----------	----------	----------	9
$13 to $13.99	4	----------	----------	----------	4
$14 to $14.99	----------	----------	----------	----------	----------
$15 to $17.99	31	----------	----------	----------	31
$18 to $20.99	26	----------	----------	----------	26
$21 to $24.99	56	----------	----------	----------	56
$25 and over	111	----------	----------	----------	111
Totals	249	----------	5	----------	254

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	246	----------	246
February	355	----------	355
March	271	----------	271
April	234	----------	234
May	253	----------	253
June	271	----------	271
July	266	----------	266
August	256	----------	256
September	254	----------	254
October	240	----------	240
November	251	----------	251
December	260	----------	260

TABLE No. 43. GLASS, CUTTING AND ORNAMENTING (including mirrors).

(7 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	12	----------
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	48	14
Under 18 years of age	----------	----------
Totals	60	14
Wage earners:		
18 years of age and over	931	25
Under 18 years of age	7	1
Totals	938	26

Salary and wage payments—annual:	
Officers, superintendents and managers	$44,825
Clerks, stenographers, salesmen, etc.	85,143
Wage earners (including piece workers)	639,074
Total	$769,042

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	----------	----------	----------	----------	----------
$4 to $4.99	----------	----------	----------	----------	----------
$5 to $5.99	----------	----------	----------	----------	----------
$6 to $6.99	2	2	----------	1	5
$7 to $7.99	----------	5	----------	----------	5
$8 to $8.99	2	----------	----------	----------	2
$9 to $9.99	----------	9	----------	----------	9
$10 to $10.99	15	----------	7	----------	22
$11 to $11.99	92	4	----------	----------	96
$12 to $12.99	110	4	----------	----------	114
$13 to $13.99	90	----------	----------	----------	90
$14 to $14.99	43	----------	----------	----------	43
$15 to $17.99	83	----------	----------	----------	83
$18 to $20.99	63	1	----------	----------	64
$21 to $24.99	83	----------	----------	----------	83
$25 and over	348	----------	----------	----------	348
Totals	931	25	7	1	964

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	610	31	641
February	851	34	885
March	922	25	947
April	743	21	764
May	1,072	25	1,097
June	1,130	32	1,162
July	744	23	767
August	300	17	317
September	800	32	832
October	979	35	1,014
November	965	33	998
December	864	29	893

TABLE No. 44. GLOVES, LEATHER.

(5 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	2	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	3	11
Under 18 years of age	2	1
Totals	7	12
Wage earners:		
18 years of age and over	28	47
Under 18 years of age	2	4
Totals	30	51

Salary and wage payments—annual:	
Officers, superintendents and managers	$3,152
Clerks, stenographers, salesmen, etc.	13,896
Wage earners (including piece workers)	45,615
Total	$62,663

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		1			1
$4 to $4.99					
$5 to $5.99	1	2		2	5
$6 to $6.99		1		1	2
$7 to $7.99	1	2			3
$8 to $8.99		8		1	9
$9 to $9.99		12			12
$10 to $10.99		8	2		10
$11 to $11.99		2			2
$12 to $12.99	3	3			6
$13 to $13.99	5	3			8
$14 to $14.99	1	2			3
$15 to $17.99	9	3			12
$18 to $20.99	8				8
$21 to $24.99					
$25 and over					
Totals	28	47	2	4	81

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	31	52	83
February	30	52	82
March	28	49	77
April	28	48	76
May	29	51	80
June	31	51	82
July	30	52	82
August	30	52	82
September	30	52	82
October	30	51	81
November	30	51	81
December	30	51	81

TABLE No. 45. GLUE AND TALLOW.

(4 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	8	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	8	1
Under 18 years of age		
Totals	16	1
Wage earners:		
18 years of age and over	81	2
Under 18 years of age		
Totals	81	2

Salary and wage payments—annual:	
Officers, superintendents and managers	$12,860
Clerks, stenographers, salesmen, etc.	16,998
Wage earners (including piece workers)	67,702
Total	$97,560

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99		1			1
$8 to $8.99					
$9 to $9.99	2				2
$10 to $10.99	9	1			10
$11 to $11.99					
$12 to $12.99	2				2
$13 to $13.99	15				15
$14 to $14.99	22				22
$15 to $17.99	13				13
$18 to $20.99	4				4
$21 to $24.99	6				6
$25 and over	8				8
Totals	81	2			83

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	76	1	77
February	78	1	79
March	79	2	81
April	77	2	79
May	77	2	79
June	76	2	78
July	76	1	77
August	80	1	81
September	82	1	83
October	83	1	84
November	83	2	85
December	81	2	83

TABLE No. 47. ICE, MANUFACTURED.

(4 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	13	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	15	6
Under 18 years of age		
Totals	28	6
Wage earners:		
18 years of age and over	162	
Under 18 years of age		
Totals	162	

Salary and wage payments—annual:	
Officers, superintendents and managers	$55,341
Clerks, stenographers, salesmen, etc.	31,220
Wage earners (including piece workers)	166,780
Total	$253,341

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99					
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	47				47
$18 to $20.99	19				19
$21 to $24.99	64				64
$25 and over	32				32
Totals	162				162

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	157		157
February	157		157
March	152		152
April	155		155
May	157		157
June	158		158
July	158		158
August	165		165
September	168		168
October	182		182
November	168		168
December	152		152

TABLE No. 48. IRON AND STEEL FORGINGS, BOLTS AND NUTS.

(3 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	7	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	5	1
Under 18 years of age		
Totals	12	1
Wage earners:		
18 years of age and over	55	
Under 18 years of age		
Totals	55	

Salary and wage payments—annual:	
Officers, superintendents and managers	$20,100
Clerks, stenographers, salesmen, etc.	7,080
Wage earners (including piece workers)	48,307
Total	$75,487

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99	2				2
$10 to $10.99	8				8
$11 to $11.99					
$12 to $12.99	7				7
$13 to $13.99	1				1
$14 to $14.99					
$15 to $17.99	3				3
$18 to $20.99	19				19
$21 to $24.99	8				8
$25 and over	7				7
Totals	55				55

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	54		54
February	51		51
March	53		53
April	51		51
May	47		47
June	43		43
July	47		47
August	57		57
September	54		54
October	53		53
November	55		55
December	55		55

TABLE No. 49. IRON AND STEEL, STRUCTURAL AND ORNAMENTAL.

(17 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	42	2
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	40	12
Under 18 years of age		
Totals	82	14
Wage earners:		
18 years of age and over	612	
Under 18 years of age	12	
Totals	624	

Salary and wage payments—annual:	
Officers, superintendents and managers	$97,859
Clerks, stenographers, salesmen, etc.	56,071
Wage earners (including piece workers)	594,312
Totals	$748,242

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99			1		1
$6 to $6.99	2		1		3
$7 to $7.99	5				5
$8 to $8.99	1		2		3
$9 to $9.99	5		3		8
$10 to $10.99	8		4		12
$11 to $11.99	14		1		15
$12 to $12.99	59				59
$13 to $13.99	14				14
$14 to $14.99	10				10
$15 to $17.99	98				98
$18 to $20.99	168				168
$21 to $24.99	108				108
$25 and over	120				120
Totals	612		12		624

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	593		593
February	584		584
March	493		493
April	560		560
May	616		616
June	583		583
July	599		599
August	658		658
September	635		635
October	624		624
November	595		595
December	668		668

TABLE No. 50. JEWELRY.

(8 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	5	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	15	4
Under 18 years of age	2	
Totals	22	4
Wage earners:		
18 years of age and over	245	30
Under 18 years of age	25	8
Totals	270	38

Salary and wage payments—annual:	
Officers, superintendents and managers	$10,340
Clerks, stenographers, salesmen, etc.	14,059
Wage earners (including piece workers)	283,620
Total	$308,019

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	1		17		18
$6 to $6.99	4	6	3	4	17
$7 to $7.99	2	3	2	4	11
$8 to $8.99	2	2	1		5
$9 to $9.99	11	8			19
$10 to $10.99	7	1			8
$11 to $11.99					
$12 to $12.99	8	2			10
$13 to $13.99	4	1			5
$14 to $14.99	3	2			5
$15 to $17.99	24	3	2		29
$18 to $20.99	37	1			38
$21 to $24.99	61	1			62
$25 and over	81				81
Totals	245	30	25	8	308

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	277	38	315
February	273	29	302
March	279	34	313
April	270	31	301
May	264	29	293
June	263	31	294
July	262	32	294
August	263	35	298
September	259	33	292
October	270	39	309
November	274	42	316
December	272	46	318

TABLE No. 51. KNIT GOODS.

(6 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	10	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	30	22
Under 18 years of age	7	
Totals	47	22
Wage earners:		
18 years of age and over	49	214
Under 18 years of age	1	23
Totals	50	237

Salary and wage payments—annual:	
Officers, superintendents and managers	$43,859
Clerks, stenographers, salesmen, etc	45,015
Wage earners (including piece workers)	127,623
Total	$216,497

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99				4	4
$6 to $6.99	1	3		4	8
$7 to $7.99		35	1	8	44
$8 to $8.99	1	25		4	30
$9 to $9.99		35		1	36
$10 to $10.99	6	29		2	37
$11 to $11.99	2	19			21
$12 to $12.99	7	24			31
$13 to $13.99		9			9
$14 to $14.99	4	7			11
$15 to $17.99	8	22			30
$18 to $20.99	5	3			8
$21 to $24.99	7	1			8
$25 and over	8	2			10
Totals	49	214	1	23	287

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	44	214	258
February	48	216	264
March	49	213	262
April	50	227	277
May	47	229	276
June	50	228	278
July	52	228	280
August	51	252	303
September	49	238	287
October	47	247	294
November	50	252	302
December	49	256	305

TABLE No. 52. LAUNDRIES, STEAM.

(24 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	42	2
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	148	71
Under 18 years of age		
Totals	190	73
Wage earners:		
18 years of age and over	733	1,139
Under 18 years of age	1	8
Totals	734	1,147

Salary and wage payments—annual:	
Officers, superintendents and managers	$97,357
Clerks, stenographers, salesmen, etc.	222,455
Wage earners (including piece workers)	1,262,946
Total	$1,582,758

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99		2			2
$7 to $7.99	3	17	1		21
$8 to $8.99	28	369		7	404
$9 to $9.99	40	230		1	271
$10 to $10.99	35	197			232
$11 to $11.99	14	115			129
$12 to $12.99	37	88			125
$13 to $13.99	12	34			46
$14 to $14.99	14	11			25
$15 to $17.99	112	48			160
$18 to $20.99	301	18			319
$21 to $24.99	72	9			81
$25 and over	65	1			66
Totals	733	1,139	1	8	1,881

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	729	1,105	1,834
February	719	1,118	1,837
March	725	1,129	1,854
April	713	1,139	1,852
May	698	1,124	1,822
June	688	1,128	1,816
July	711	1,156	1,867
August	727	1,211	1,938
September	737	1,238	1,975
October	740	1,197	1,937
November	734	1,180	1,914
December	733	1,154	1,887

TABLE No. 53. LEATHER GOODS.

(8 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	6	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	13	2
Under 18 years of age	2	
Totals	21	2
Wage earners:		
18 years of age and over	52	3
Under 18 years of age	2	
Totals	54	3

Salary and wage payments—annual:	
Officers, superintendents and managers	$11,296
Clerks, stenographers, salesmen, etc.	6,378
Wage earners (including piece workers)	44,525
Total	$62,199

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99			1		1
$6 to $6.99					
$7 to $7.99	1		1		2
$8 to $8.99					
$9 to $9.99		2			2
$10 to $10.99	2	1			3
$11 to $11.99					
$12 to $12.99	3				3
$13 to $13.99	3				3
$14 to $14.99	2				2
$15 to $17.99	7				7
$18 to $20.99	11				11
$21 to $24.99	17				17
$25 and over	3				3
Totals	52	3	2		57

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	48	3	51
February	52	3	55
March	51	3	54
April	55	3	58
May	57	3	60
June	51	3	54
July	50	3	53
August	47	3	50
September	46	3	49
October	52	3	55
November	53	3	56
December	54	3	57

TABLE No. 55. LIQUORS, MALT.

(15 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	41	2
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	55	7
Under 18 years of age		
Totals	96	9
Wage earners:		
18 years of age and over	339	
Under 18 years of age		
Totals	339	

Salary and wage payments—annual:	
Officers, superintendents and managers	$125,811
Clerks, stenographers, salesmen, etc.	80,434
Wage earners (including piece workers)	421,943
Total	$628,188

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99	1				1
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	1				1
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	29				29
$18 to $20.99	6				6
$21 to $24.99	106				106
$25 and over	196				196
Totals	339				339

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	328		328
February	339		339
March	339		339
April	346		346
May	343		343
June	339		339
July	337		337
August	334		334
September	336		336
October	335		335
November	347		347
December	339		339

TABLE No. 57. LUMBER INDUSTRY—PLANING MILLS.

(12 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	17	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	14	3
Under 18 years of age		
Totals	31	3
Wage earners:		
18 years of age and over	215	
Under 18 years of age	1	
Totals	216	

Salary and wage payments—annual:	
Officers, superintendents and managers	$34,928
Clerks, stenographers, salesmen, etc	21,466
Wage earners (including piece workers)	229,246
Total	$285,640

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99	7		1		8
$10 to $10.99	5				5
$11 to $11.99					
$12 to $12.99	10				10
$13 to $13.99	9				9
$14 to $14.99	1				1
$15 to $17.99	23				23
$18 to $20.99	16				16
$21 to $24.99	54				54
$25 and over	90				90
Totals	215		1		216

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	234		234
February	236		236
March	210		210
April	220		220
May	208		208
June	229		229
July	229		229
August	205		205
September	190		190
October	194		194
November	216		216
December	195		195

TABLE No. 58. LUMBER INDUSTRY—SASH AND DOOR MILLS AND HOUSE FINISH.

(4 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	6	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	5	2
Under 18 years of age	4	2
Totals	15	4
Wage earners:		
18 years of age and over	155	
Under 18 years of age	2	
Totals	157	

Salary and wage payments—annual:	
Officers, superintendents and managers	$15,084
Clerks, stenographers, salesmen, etc.	13,664
Wage earners (including piece workers)	149,529
Total	$178,277

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4			1		1
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	10		1		11
$13 to $13.99	13				13
$14 to $14.99	19				19
$15 to $17.99	7				7
$18 to $20.99	14				14
$21 to $24.99	22				22
$25 and over	70				70
Totals	155		2		157

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	182		182
February	188		188
March	174		174
April	163		163
May	156		156
June	164		164
July	157		157
August	155		155
September	144		144
October	151		151
November	155		155
December	149		149

TABLE No. 61. MARBLE AND STONE WORK.

(3 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	7	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	13	5
Under 18 years of age		
Totals	20	5
Wage earners:		
18 years of age and over	99	
Under 18 years of age		
Totals	99	

Salary and wage payments—annual:	
Officers, superintendents and managers	$17,208
Clerks, stenographers, salesmen, etc.	13,499
Wage earners (including piece workers)	98,948
Total	$129,655

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99	1				1
$12 to $12.99					
$13 to $13.99	1				1
$14 to $14.99	1				1
$15 to $17.99	19				19
$18 to $20.99	15				15
$21 to $24.99	33				33
$25 and over	29				29
Totals	99				99

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	99		99
February	98		98
March	101		101
April	88		88
May	93		93
June	99		99
July	106		106
August	107		107
September	90		90
October	90		90
November	89		89
December	99		99

TABLE No. 62. MATTRESSES, PILLOWS AND BEDDING.

(11 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	18	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	19	9
Under 18 years of age		1
Totals	37	10
Wage earners:		
18 years of age and over	120	24
Under 18 years of age	4	1
Totals	124	25

Salary and wage payments—annual:	
Officers, superintendents and managers	$28,613
Clerks, stenographers, salesmen, etc.	26,393
Wage earners (including piece workers)	108,649
Total	$163,655

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99			2		2
$6 to $6.99	1	1	2		4
$7 to $7.99	1	2		1	4
$8 to $8.99	1	5			6
$9 to $9.99		2			2
$10 to $10.99	1	3			4
$11 to $11.99	1				1
$12 to $12.99	14	8			22
$13 to $13.99	11	1			12
$14 to $14.99	7				7
$15 to $17.99	16	1			17
$18 to $20.99	19	1			20
$21 to $24.99	46				46
$25 and over	2				2
Totals	120	24	4	1	149

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	128	27	155
February	128	25	153
March	134	28	162
April	125	24	149
May	116	24	140
June	125	24	149
July	116	22	138
August	112	22	134
September	119	26	145
October	124	27	151
November	122	25	147
December	119	29	148

TABLE No. 63. METAL SIGNS, STENCILS AND RUBBER STAMPS.

(3 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	10	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	24	2
Under 18 years of age	2	
Totals	36	2
Wage earners:		
18 years of age and over	41	4
Under 18 years of age	1	
Totals	42	4

Salary and wage payments—annual:	
Officers, superintendents and managers	$27,640
Clerks, stenographers, salesmen, etc.	21,428
Wage earners (including piece workers)	33,932
Total	$83,000

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99			1		1
$6 to $6.99					
$7 to $7.99					
$8 to $8.99	1				1
$9 to $9.99					
$10 to $10.99	2				2
$11 to $11.99					
$12 to $12.99	8				8
$13 to $13.99	1	1			2
$14 to $14.99	1				1
$15 to $17.99	10				10
$18 to $20.99	9	3			12
$21 to $24.99	5				5
$25 and over	4				4
Totals	41	4	1		46

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	42	4	46
February	42	4	46
March	42	4	46
April	42	4	46
May	42	4	46
June	42	4	46
July	42	4	46
August	42	4	46
September	42	4	46
October	42	4	46
November	42	4	46
December	42	4	46

TABLE No. 64. MILLINERY.

(6 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	7	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	7	4
Under 18 years of age	3	
Totals	17	4
Wage earners:		
18 years of age and over	21	66
Under 18 years of age	1	1
Totals	22	67

Salary and wage payments—annual:	
Officers, superintendents and managers	$20,425
Clerks, stenographers, salesmen, etc.	11,710
Wage earners (including piece workers)	52,270
Total	$84,405

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	2	17	1		20
$7 to $7.99	1	7		1	9
$8 to $8.99		3			3
$9 to $9.99	1	5			6
$10 to $10.99		3			3
$11 to $11.99		3			3
$12 to $12.99	2	6			8
$13 to $13.99		2			2
$14 to $14.99		2			2
$15 to $17.99	3	6			9
$18 to $20.99	4	3			7
$21 to $24.99	4	1			5
$25 and over	4	8			12
Totals	21	66	1	1	89

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	26	64	90
February	27	97	124
March	35	115	150
April	27	74	101
May	17	43	60
June	19	45	64
July	22	54	76
August	31	83	114
September	33	83	116
October	27	77	104
November	23	53	76
December	18	63	81

TABLE No. 65. OIL STOVES AND OIL BURNING EQUIPMENT.

(3 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	7	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	3	3
Under 18 years of age		
Totals	10	4
Wage earners:		
18 years of age and over	49	
Under 18 years of age	1	
Totals	50	

Salary and wage payments—annual:	
Officers, superintendents and managers	$14,860
Clerks, stenographers, salesmen, etc.	5,510
Wage earners (including piece workers)	44,751
Total	$65,121

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1				1
$7 to $7.99			1		1
$8 to $8.99	1				1
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99					
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	5				5
$18 to $20.99	12				12
$21 to $24.99	28				28
$25 and over	2				2
Totals	49		1		50

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	50		50
February	45		45
March	43		43
April	40		40
May	40		40
June	41		41
July	41		41
August	42		42
September	50		50
October	46		46
November	49		49
December	50		50

TABLE No. 67. PACKING AND PROCESSING OF DRIED FRUITS.

(4 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	12	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	31	16
Under 18 years of age	5	
Totals	48	16
Wage earners:		
18 years of age and over	98	97
Under 18 years of age		
Totals	98	97

Salary and wage payments—annual:	
Officers, superintendents and managers	$117,476
Clerks, stenographers, salesmen, etc.	22,789
Wage earners (including piece workers)	146,272
Total	$286,537

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99		2			2
$8 to $8.99		1			1
$9 to $9.99		23			23
$10 to $10.99		16			16
$11 to $11.99		15			15
$12 to $12.99	1	26			27
$13 to $13.99	9	6			15
$14 to $14.99		5			5
$15 to $17.99	74	2			76
$18 to $20.99	14	1			15
$21 to $24.99					
$25 and over					
Totals	98	97			195

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	86	100	186
February	84	107	191
March	76	56	132
April	63	81	144
May	36	35	71
June	37	21	58
July	63	57	120
August	92	102	194
September	116	111	227
October	151	186	337
November	154	157	311
December	110	106	216

TABLE No. 68. PAINTS AND VARNISHES.

(9 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	18	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	23	9
Under 18 years of age		
Totals	41	9
Wage earners:		
18 years of age and over	68	3
Under 18 years of age	1	
Totals	69	3

Salary and wage payments—annual:	
Officers, superintendents and managers	$36,790
Clerks, stenographers, salesmen, etc.	49,946
Wage earners (including piece workers)	66,287
Total	$153,023

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99	1		1		2
$5 to $5.99					
$6 to $6.99					
$7 to $7.99	1				1
$8 to $8.99					
$9 to $9.99	1				1
$10 to $10.99	1				1
$11 to $11.99					
$12 to $12.99	4	1			5
$13 to $13.99	8	1			9
$14 to $14.99					
$15 to $17.99	28	1			29
$18 to $20.99	15				15
$21 to $24.99	6				6
$25 and over	3				3
Totals	68	3	1		72

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	69	3	72
February	72	3	75
March	72	3	75
April	67	3	70
May	69	3	72
June	74	3	77
July	75	4	79
August	74	3	77
September	77	3	80
October	71	3	74
November	68	3	71
December	69	3	72

TABLE No. 69. PAPER AND PAPER GOODS (not elsewhere specified).

(4 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	8	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	9	19
Under 18 years of age		
Totals	17	19
Wage earners:		
18 years of age and over	73	106
Under 18 years of age	4	20
Totals	77	126

Salary and wage payments—annual:	
Officers, superintendents and managers	$17,161
Clerks, stenographers, salesmen, etc.	32,869
Wage earners (including piece workers)	92,862
Total	$142,892

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99		2	1	9	12
$6 to $6.99		36	2	9	47
$7 to $7.99		25	1	1	27
$8 to $8.99		24		1	25
$9 to $9.99	4	9			13
$10 to $10.99	4	1			5
$11 to $11.99		2			2
$12 to $12.99	6	2			8
$13 to $13.99	4	3			7
$14 to $14.99	4	1			5
$15 to $17.99	16	1			17
$18 to $20.99	23				23
$21 to $24.99	9				9
$25 and over	3				3
Totals	73	106	4	20	203

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	47	84	131
February	57	87	144
March	63	93	156
April	64	98	162
May	64	100	164
June	66	96	162
July	61	97	158
August	62	99	161
September	67	116	183
October	67	116	183
November	72	126	198
December	77	126	203

TABLE No. 70. PATENT MEDICINES, COMPOUNDS AND DRUGGISTS' PREPARATIONS.

(10 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	13	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	42	34
Under 18 years of age		
Totals	55	35
Wage earners:		
18 years of age and over	67	78
Under 18 years of age		5
Totals	67	83

Salary and wage payments—annual:	
Officers, superintendents and managers	$28,484
Clerks, stenographers, salesmen, etc.	42,700
Wage earners (including piece workers)	40,580
Total	$111,764

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		1			1
$4 to $4.99					
$5 to $5.99		1			1
$6 to $6.99	1	4		5	10
$7 to $7.99	5	14			19
$8 to $8.99	6	7			13
$9 to $9.99	3	10			13
$10 to $10.99	9	10			19
$11 to $11.99	2	11			13
$12 to $12.99	7	8			15
$13 to $13.99	2	5			7
$14 to $14.99	4	4			8
$15 to $17.99	14	2			16
$18 to $20.99	6	1			7
$21 to $24.99	3				3
$25 and over	5				5
Totals	67	78		5	150

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	58	74	132
February	59	73	132
March	61	80	141
April	61	79	140
May	61	108	169
June	65	100	165
July	64	120	184
August	63	114	177
September	63	114	177
October	70	122	192
November	69	114	183
December	68	112	180

TABLE No. 72. PHOTO-ENGRAVING, ELECTROTYPING AND STEREOTYPING.

(16 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	27	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	55	22
Under 18 years of age	3	
Totals	85	22
Wage earners:		
18 years of age and over	426	48
Under 18 years of age	28	31
Totals	454	79

Salary and wage payments—annual:	
Officers, superintendents and managers	$64,695
Clerks, stenographers, salesmen, etc.	92,014
Wage earners (including piece workers)	430,645
Total	$587,354

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	1		1		2
$6 to $6.99	8	17	13	17	55
$7 to $7.99	1	7	10	10	28
$8 to $8.99	39	7	4	4	54
$9 to $9.99	23	4			27
$10 to $10.99	30	5			35
$11 to $11.99	16	2			18
$12 to $12.99	22				22
$13 to $13.99	17	1			18
$14 to $14.99	13	2			15
$15 to $17.99	40	1			41
$18 to $20.99	31	2			33
$21 to $24.99	40				40
$25 and over	145				145
Totals	426	48	28	31	533

Number of Wage Earners by Months.

Month	Males	Females	Total
January	403	70	473
February	424	69	493
March	416	64	480
April	418	61	479
May	400	57	457
June	402	57	459
July	401	59	460
August	422	63	485
September	446	67	513
October	476	71	547
November	470	72	542
December	454	79	533

TABLE No. 73. PRINTING AND PUBLISHING.

(84 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	129	4
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	531	121
Under 18 years of age	15	4
Totals	675	129
Wage earners:		
18 years of age and over	1,492	339
Under 18 years of age	58	16
Totals	1,550	355

Salary and wage payments—annual:	
Officers, superintendents and managers	$390,190
Clerks, stenographers, salesmen, etc.	808,034
Wage earners (including piece workers)	1,759,694
Total	$2,957,918

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	2		12		14
$4 to $4.99	3	1	1	1	6
$5 to $5.99	5	5	14	9	33
$6 to $6.99	21	10	12	6	49
$7 to $7.99	21	11	9		41
$8 to $8.99	31	20	6		57
$9 to $9.99	30	30	3		63
$10 to $10.99	38	124	1		163
$11 to $11.99	9	37			46
$12 to $12.99	37	38			75
$13 to $13.99	50	4			54
$14 to $14.99	16	8			24
$15 to $17.99	171	24			195
$18 to $20.99	92	12			104
$21 to $24.99	310	5			315
$25 and over	656	10			666
Totals	1,492	339	58	16	1,905

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	1,526	338	1,864
February	1,568	358	1,926
March	1,554	386	1,940
April	1,530	363	1,893
May	1,550	334	1,884
June	1,548	353	1,901
July	1,545	367	1,912
August	1,523	341	1,864
September	1,539	337	1,876
October	1,550	355	1,905
November	1,567	369	1,936
December	1,576	341	1,917

TABLE No. 76. RUBBER GOODS, MECHANICAL, AND RUBBER SPECIALTIES.

(3 establishments reporting.)
San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	2	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	1	2
Under 18 years of age		
Totals	3	2
Wage earners:		
18 years of age and over	36	5
Under 18 years of age		
Totals	36	5

Salary and wage payments—annual:	
Officers, superintendents and managers	$4,425
Clerks, stenographers, salesmen, etc.	3,540
Wage earners (including piece workers)	36,560
Total	$44,525

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99	1				1
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	2	2			4
$13 to $13.99	1	1			2
$14 to $14.99	2				2
$15 to $17.99	12	2			14
$18 to $20.99	4				4
$21 to $24.99	9				9
$25 and over	5				5
Totals	36	5			41

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	35	7	42
February	35	7	42
March	34	7	41
April	34	7	41
May	34	7	41
June	39	6	45
July	39	6	45
August	28		28
September	34	6	40
October	36	7	43
November	37	7	44
December	36	5	41

TABLE No. 78. SHEET METAL WORKS (not including tin cans).

(14 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	15	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	9	3
Under 18 years of age		
Totals	24	3
Wage earners:		
18 years of age and over	87	
Under 18 years of age	3	
Totals	90	

Salary and wage payments—annual:	
Officers, superintendents and managers	$30,603
Clerks, stenographers, salesmen, etc.	6,511
Wage earners (including piece workers)	94,806
Total	$131,920

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1				1
$7 to $7.99	1		1		2
$8 to $8.99	1				1
$9 to $9.99			1		1
$10 to $10.99	3				3
$11 to $11.99			1		1
$12 to $12.99	4				4
$13 to $13.99					
$14 to $14.99	3				3
$15 to $17.99	10				10
$18 to $20.99	6				6
$21 to $24.99	9				9
$25 and over	49				49
Totals	87		3		90

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	98		98
February	106		106
March	91		91
April	82		82
May	79		79
June	82		82
July	82		82
August	82		82
September	71		71
October	81		81
November	87		87
December	81		81

TABLE No. 79. SHIP BUILDING (including boat building).

(5 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	43	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	75	16
Under 18 years of age		
Totals	118	16
Wage earners:		
18 years of age and over	2,727	
Under 18 years of age	108	
Totals	2,835	

Salary and wage payments—annual:	
Officers, superintendents and managers	$131,828
Clerks, stenographers, salesmen, etc.	95,430
Wage earners (including piece workers)	2,384,651
Total	$2,611,909

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99	8		18		26
$5 to $5.99	20		58		78
$6 to $6.99	22		23		45
$7 to $7.99	109		9		118
$8 to $8.99	10				10
$9 to $9.99	86				86
$10 to $10.99	21				21
$11 to $11.99	265				265
$12 to $12.99	471				471
$13 to $13.99	448				448
$14 to $14.99	247				247
$15 to $17.99	248				248
$18 to $20.99	557				557
$21 to $24.99	185				185
$25 and over	30				30
Totals	2,727		108		2,835

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	2,230		2,230
February	2,179		2,179
March	1,360		1,360
April	2,377		2,377
May	1,516		1,516
June	1,774		1,774
July	1,992		1,992
August	2,835		2,835
September	2,941		2,941
October	2,971		2,971
November	3,095		3,095
December	3,329		3,329

TABLE No. 80. SLAUGHTERING AND MEAT PACKING.

(13 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	21	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	55	8
Under 18 years of age	1	
Totals	77	9
Wage earners:		
18 years of age and over	402	4
Under 18 years of age		
Totals	402	4

Salary and wage payments—annual:	
Officers, superintendents and managers	$43,850
Clerks, stenographers, salesmen, etc.	82,624
Wage earners (including piece workers)	378,518
Total	$504,992

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	1				1
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99	1	2			3
$8 to $8.99	1				1
$9 to $9.99	8	1			9
$10 to $10.99	9				9
$11 to $11.99	6	1			7
$12 to $12.99	30				30
$13 to $13.99	18				18
$14 to $14.99	10				10
$15 to $17.99	74				74
$18 to $20.99	155				155
$21 to $24.99	58				58
$25 and over	31				31
Totals	402	4			406

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	401	4	405
February	398	4	402
March	409	4	413
April	401	4	405
May	402	4	406
June	398	4	402
July	397	4	401
August	405	4	409
September	414	4	418
October	408	4	412
November	408	4	412
December	406	4	410

TABLE No. 82. SOAP, WASHING POWDER, ETC.

(4 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	3	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	10	1
Under 18 years of age		
Totals	13	1
Wage earners:		
18 years of age and over	30	10
Under 18 years of age		
Totals	30	10

Salary and wage payments—annual:	
Officers, superintendents and managers	$9,600
Clerks, stenographers, salesmen, etc.	21,200
Wage earners (including piece workers)	36,188
Total	$66,988

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99		5			5
$10 to $10.99		2			2
$11 to $11.99		3			3
$12 to $12.99					
$13 to $13.99	1				1
$14 to $14.99	2				2
$15 to $17.99	11				11
$18 to $20.99	4				4
$21 to $24.99	8				8
$25 and over	4				4
Totals	30	10			40

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	24	10	34
February	30	10	40
March	30	10	40
April	30	10	40
May	30	10	40
June	30	10	40
July	30	10	40
August	30	10	40
September	30	10	40
October	30	10	40
November	30	10	40
December	30	10	40

TABLE No 83. STOVES AND FURNACES (not including oil stoves).

(3 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	8	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	11	1
Under 18 years of age		
Totals	19	1
Wage earners:		
18 years of age and over	109	
Under 18 years of age	2	
Totals	111	

Salary and wage payments—annual:	
Officers, superintendents and managers	$17,760
Clerks, stenographers, salesmen, etc.	17,020
Wage earners (including piece workers)	110,480
Total	$145,260

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	5				5
$7 to $7.99			1		1
$8 to $8.99					
$9 to $9.99			1		1
$10 to $10.99	2				2
$11 to $11.99					
$12 to $12.99	2				2
$13 to $13.99	5				5
$14 to $14.99					
$15 to $17.99	15				15
$18 to $20.99	15				15
$21 to $24.99	24				24
$25 and over	41				41
Totals	109		2		111

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	113		113
February	116		116
March	113		113
April	108		108
May	112		112
June	108		108
July	112		112
August	108		108
September	103		103
October	104		104
November	105		105
December	111		111

TABLE No. 85. TANNING.

(10 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	20	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	9	3
Under 18 years of age		
Totals	29	3
Wage earners:		
18 years of age and over	457	
Under 18 years of age	1	
Totals	458	

Salary and wage payments—annual:	
Officers, superintendents and managers	$70,284
Clerks, stenographers, salesmen, etc.	17,264
Wage earners (including piece workers)	335,680
Total	$423,228

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99			1		1
$8 to $8.99					
$9 to $9.99	2				2
$10 to $10.99	7				7
$11 to $11.99	2				2
$12 to $12.99	66				66
$13 to $13.99	101				101
$14 to $14.99	48				48
$15 to $17.99	160				160
$18 to $20.99	35				35
$21 to $24.99	24				24
$25 and over	12				12
Totals	457		1		458

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	510		510
February	490		490
March	478		478
April	431		431
May	380		380
June	402		402
July	382		382
August	430		430
September	437		437
October	419		419
November	458		458
December	468		468

TABLE No. 86. TOBACCO MANUFACTURES.

(32 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	19	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	152	44
Under 18 years of age		
Totals	171	44
Wage earners:		
18 years of age and over	390	226
Under 18 years of age	5	13
Totals	395	239

Salary and wage payments—annual:	
Officers, superintendents and managers	$53,852
Clerks, stenographers, salesmen, etc.	204,110
Wage earners (including piece workers)	365,028
Total	$622,990

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	12	24		1	37
$6 to $6.99	11	38		6	55
$7 to $7.99	20	39		2	61
$8 to $8.99	14	27			41
$9 to $9.99	15	25	4		44
$10 to $10.99	16	27		4	47
$11 to $11.99	8	14			22
$12 to $12.99	23	18	1		42
$13 to $13.99	22	7			29
$14 to $14.99	28	4			32
$15 to $17.99	90	2			92
$18 to $20.99	71				71
$21 to $24.99	41	1			42
$25 and over	19				19
Totals	390	226	5	13	634

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	403	266	669
February	404	245	649
March	410	239	649
April	324	226	550
May	393	236	629
June	384	237	621
July	347	218	565
August	357	226	583
September	366	241	607
October	395	239	634
November	398	249	647
December	365	231	596

TABLE No. 87. TRUNKS, VALISES, ETC.

(6 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	6	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	14	4
Under 18 years of age	10	
Totals	30	4
Wage earners:		
18 years of age and over	83	15
Under 18 years of age	1	1
Totals	84	16

Salary and wage payments—annual:	
Officers, superintendents and managers	$7,200
Clerks, stenographers, salesmen, etc.	24,856
Wage earners (including piece workers)	68,684
Total	$100,740

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	1				1
$6 to $6.99	2	1		1	4
$7 to $7.99	3	1	1		5
$8 to $8.99	1	4			5
$9 to $9.99	2	3			5
$10 to $10.99	2	4			6
$11 to $11.99					
$12 to $12.99	5	1			6
$13 to $13.99	4	1			5
$14 to $14.99	4				4
$15 to $17.99	19				19
$18 to $20.99	30				30
$21 to $24.99	8				8
$25 and over	2				2
Totals	83	15	1	1	100

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	66	10	76
February	71	11	82
March	70	11	81
April	75	13	88
May	78	15	93
June	75	14	89
July	80	13	93
August	83	16	99
September	86	15	101
October	92	16	108
November	86	16	102
December	84	16	100

TABLE No. 88. WINDOW SHADES.

(3 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	1	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	1	1
Under 18 years of age		
Totals	2	1
Wage earners:		
18 years of age and over	14	7
Under 18 years of age		
Totals	14	7

Salary and wage payments—annual:	
Officers, superintendents and managers	$500
Clerks, stenographers, salesmen, etc.	4,008
Wage earners (including piece workers)	15,761
Total	$20,269

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1	2			3
$7 to $7.99		2			2
$8 to $8.99	1				1
$9 to $9.99		1			1
$10 to $10.99		1			1
$11 to $11.99					
$12 to $12.99		1			1
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	2				2
$18 to $20.99					
$21 to $24.99	8				8
$25 and over	2				2
Totals	14	7			21

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	12	6	18
February	12	6	18
March	13	6	19
April	13	6	19
May	14	6	20
June	15	6	21
July	13	6	19
August	13	6	19
September	13	6	19
October	11	6	17
November	13	6	19
December	13	6	19

TABLE No. 89. WIRE WORK (including wire rope, netting, etc.)

(5 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	14	1
Clerks stenographers, salesmen, etc.:		
18 years of age and over	22	6
Under 18 years of age		
Totals	36	7
Wage earners:		
18 years of age and over	129	
Under 18 years of age		
Totals	129	

Salary and wage payments—annual:	
Officers, superintendents and managers	$25,463
Clerks, stenographers, salesmen, etc.	28,451
Wage earners (including piece workers)	121,688
Total	$175,602

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99	2				2
$8 to $8.99					
$9 to $9.99	7				7
$10 to $10.99	2				2
$11 to $11.99					
$12 to $12.99	2				2
$13 to $13.99	14				14
$14 to $14.99	1				1
$15 to $17.99	28				28
$18 to $20.99	30				30
$21 to $24.99	27				27
$25 and over	16				16
Totals	129				129

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	150		150
February	163		163
March	163		163
April	146		146
May	130		130
June	129		129
July	118		118
August	119		119
September	120		120
October	129		129
November	124		124
December	131		131

TABLE No. 90. ALL OTHER INDUSTRIES.*

(55 establishments reporting.)

San Francisco.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	109	2
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	191	59
Under 18 years of age	4	2
Totals	304	63
Wage earners:		
18 years of age and over	1,102	100
Under 18 years of age	12	3
Totals	1,114	103

Salary and wage payments—annual:	
Officers, superintendents and managers	$378,812
Clerks, stenographers, salesmen, etc.	280,458
Wage earners (including piece workers)	1,041,429
Total	$1,700,699

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4			1		1
$4 to $4.99		3	1		4
$5 to $5.99		3	2		5
$6 to $6.99	4	38	3	2	47
$7 to $7.99	10	6	5	1	22
$8 to $8.99	5	16			21
$9 to $9.99	39	17			56
$10 to $10.99	29	7			36
$11 to $11.99	25				25
$12 to $12.99	87	3			90
$13 to $13.99	68				68
$14 to $14.99	29	1			30
$15 to $17.99	287	6			293
$18 to $20.99	210				210
$21 to $24.99	220				220
$25 and over	89				89
Totals	1,102	100	12	3	1,217

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	970	54	1,024
February	1,019	66	1,085
March	1,100	71	1,171
April	1,076	74	1,150
May	1,047	72	1,119
June	1,085	80	1,165
July	1,075	89	1,164
August	1,116	83	1,199
September	1,114	93	1,207
October	1,114	103	1,217
November	1,173	101	1,274
December	1,116	99	1,215

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*See note on following page.

INDUSTRIES AND NUMBER OF ESTABLISHMENTS INCLUDED IN TABLE No. 90, "ALL OTHER INDUSTRIES."

San Francisco.

Babbitt, metals and solders	3
Beds, wall	1
Boiler compounds, packing, etc.	1
Bottling, beer	1
Cocoanut oil and cocoanut cake	2
Cordage	1
Cordials and fruit brandies	1
Cream of tartar and yeast	2
Display fixtures, wax, etc.	2
Felt and felt products	1
Flavoring extracts and perfumes	1
Galvanizing and electroplating	2
Gas and electric fixtures	2
Inks and paste	2
Laboratory supplies	1
Linen goods, table cloths, etc.	1
Metal specialties, etc.	1
Motion picture films, etc.	1
Musical instruments, pianos, etc.	1
Nautical, surveying instruments and supplies	2
Ornamental plaster	1
Patterns, wood and metal	4
Polish and cleaning fluids	2
Registers and calculating machines	1
Roofing materials and building papers	1
Rug weaving	1
Salt refining	2
Shoddy, wool	1
Sidewalk doors and lights	2
Smelting and refining	1
Sugar refining	1
Surgical appliances, etc.	2
Sweeping compounds, etc.	1
Toys	1
Tricycles and supplies	1
Typewriter supplies	2
Hats and caps, men's	2

TABLE No. 1. ALL INDUSTRIES (TOTAL).

(547 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	907	25
Clerks, stenographers, salesmen, etc.		
18 years of age and over	1,849	608
Under 18 years of age	38	5
Totals	2,794	638
Wage earners:		
18 years of age and over	10,203	3,595
Under 18 years of age	149	52
Totals	10,352	3,647

Salary and wage payments—annual:	
Officers, superintendents and managers	$2,105,104
Clerks, stenographers, salesmen, etc.	2,500,126
Wage earners (including piece workers)	9,754.111
Total	$14.359,341

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	42	65	4	3	114
$4 to $4.99	15	69	4		88
$5 to $5.99	16	117	11	14	158
$6 to $6.99	83	518	43	16	660
$7 to $7.99	184	760	26	11	981
$8 to $8.99	118	521	21	2	662
$9 to $9.99	231	539	16	4	790
$10 to $10.99	388	339	22	2	751
$11 to $11.99	151	138	1		290
$12 to $12.99	1,001	209	1		1,211
$13 to $13.99	750	73			823
$14 to $14.99	507	76			583
$15 to $17.99	2,163	120			2,283
$18 to $20.99	2,084	32			2,116
$21 to $24.99	1,450	12			1,462
$25 and over	1,020	7			1,027
Totals	10,203	3,595	149	52	13.999

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	10,154	3,216	13.370
February	9,923	3,199	13,122
March	9.978	3,207	13,185
April	10,127	3,232	13,359
May	10,281	3,444	13,725
June	10,334	3,425	13,759
July	10,239	3,543	13,782
August	10,527	3,793	14,320
September	10,024	3,739	13.763
October	10,090	3,847	13,937
November	10,163	3,523	13,686
December	10,628	3,774	14,402

TABLE No. 3. ARTIFICIAL STONE, CLAY AND CONCRETE PRODUCTS.

(10 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	14	
Clerks, stenographers, salesmen, etc.		
18 years of age and over	5	2
Under 18 years of age		
Totals	19	2
Wage earners:		
18 years of age and over	87	
Under 18 years of age		
Totals	87	

Salary and wage payments—annual:	
Officers, superintendents and managers	$21,907
Clerks, stenographers, salesmen, etc.	7,300
Wage earners (including piece workers)	75,997
Total	$105,204

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1				1
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99	4				4
$11 to $11.99	2				2
$12 to $12.99	4				4
$13 to $13.99	9				9
$14 to $14.99	1				1
$15 to $17.99	16				16
$18 to $20.99	25				25
$21 to $24.99	12				12
$25 and over	13				13
Totals	87				87

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	90		90
February	82		82
March	85		85
April	76		76
May	90		90
June	93		93
July	96		96
August	74		74
September	77		77
October	87		87
November	92		92
December	95		95

TABLE No. 4. AUTOMOBILES (including bodies and parts).

(15 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	25	
Clerks, stenographers, salesmen, etc.		
18 years of age and over	25	13
Under 18 years of age	1	
Totals	51	13
Wage earners:		
18 years of age and over	304	6
Under 18 years of age	3	
Totals	307	6

Salary and wage payments—annual:	
Officers, superintendents and managers	$45,508
Clerks, stenographers, salesmen, etc.	30,465
Wage earners (including piece workers)	259,634
Total	$335,607

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	5		1		6
$7 to $7.99	3				3
$8 to $8.99	1	1			2
$9 to $9.99	2	1	2		5
$10 to $10.99	2	1			3
$11 to $11.99	2				2
$12 to $12.99	15				15
$13 to $13.99	25	1			26
$14 to $14.99	16				16
$15 to $17.99	42	2			44
$18 to $20.99	94				94
$21 to $24.99	70				70
$25 and over	27				27
Totals	304	6	3		313

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	278	6	284
February	284	6	290
March	288	6	294
April	286	6	292
May	294	6	300
June	297	6	303
July	306	6	312
August	307	6	313
September	203	6	209
October	311	6	317
November	318	6	324
December	307	6	313

TABLE No. 5. AWNINGS, TENTS AND SAILS.

(5 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	5	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	5	6
Under 18 years of age		
Totals	10	6
Wage earners:		
18 years of age and over	21	24
Under 18 years of age		
Totals	21	24

Salary and wage payments—annual:	
Officers, superintendents and managers	$7,516
Clerks, stenographers, salesmen, etc.	5,496
Wage earners (including piece workers)	26,701
Total	$39,713

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99		1			1
$7 to $7.99		3			3
$8 to $8.99	2	5			7
$9 to $9.99		8			8
$10 to $10.99	2	2			4
$11 to $11.99		2			2
$12 to $12.99		2			2
$13 to $13.99					
$14 to $14.99	2				2
$15 to $17.99	8	1			9
$18 to $20.99	4				4
$21 to $24.99					
$25 and over	3				3
Totals	21	24			45

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	17	20	37
February	17	19	36
March	17	26	43
April	20	31	51
May	19	29	48
June	21	24	45
July	21	26	47
August	19	29	48
September	17	26	43
October	17	26	43
November	17	22	39
December	19	23	42

TABLE No. 8. BAKERY PRODUCTS.

(22 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	41	3
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	128	16
Under 18 years of age		
Totals	169	19
Wage earners:		
18 years of age and over	632	140
Under 18 years of age	3	1
Totals	635	141

Salary and wage payments—annual:	
Officers, superintendents and managers	$141,538
Clerks, stenographers, salesmen, etc.	178,015
Wage earners (including piece workers)	629,639
Total	$949,192

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	2	28	3		33
$7 to $7.99	3	22			25
$8 to $8.99	1	12		1	14
$9 to $9.99	2	16			18
$10 to $10.99	7	28			35
$11 to $11.99		9			9
$12 to $12.99	39	12			51
$13 to $13.99	12	2			14
$14 to $14.99	21	5			26
$15 to $17.99	208	4			212
$18 to $20.99	227	2			229
$21 to $24.99	67				67
$25 and over	43				43
Totals	632	140	3	1	776

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	626	130	756
February	635	141	776
March	647	153	800
April	649	140	789
May	646	141	787
June	634	146	780
July	653	154	807
August	649	143	792
September	642	137	779
October	631	136	767
November	633	154	787
December	643	169	812

TABLE No. 11. BOILERS AND TANKS.

(4 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	9	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	10	1
Under 18 years of age		
Totals	19	1
Wage earners:		
18 years of age and over	111	
Under 18 years of age	2	
Totals	113	

Salary and wage payments—annual:	
Officers, superintendents and managers	$29,222
Clerks, stenographers, salesmen, etc.	12,224
Wage earners (including piece workers)	177,859
Total	$219,305

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99			1		1
$8 to $8.99					
$9 to $9.99	1		1		2
$10 to $10.99					
$11 to $11.99					
$12 to $12.99					
$13 to $13.99	5				5
$14 to $14.99					
$15 to $17.99	35				35
$18 to $20.99	18				18
$21 to $24.99	43				43
$25 and over	9				9
Totals	111		2		113

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	112		112
February	125		125
March	117		117
April	117		117
May	124		124
June	146		146
July	144		144
August	158		158
September	144		144
October	119		119
November	117		117
December	113		113

TABLE No. 13. BOXES, BAGS, CARTONS, ETC., PAPER.

(7 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	13	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	10	2
Under 18 years of age		
Totals	23	2
Wage earners:		
18 years of age and over	94	154
Under 18 years of age	7	14
Totals	101	168

Salary and wage payments—annual:	
Officers, superintendents and managers	$27,996
Clerks, stenographers, salesmen, etc.	21,848
Wage earners (including piece workers)	164,410
Total	$214,254

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99		22		9	31
$6 to $6.99		19		5	24
$7 to $7.99		24			24
$8 to $8.99	4	30	4		38
$9 to $9.99	4	22	3		29
$10 to $10.99	8	18			26
$11 to $11.99	5	8			13
$12 to $12.99	9	6			15
$13 to $13.99	10	3			13
$14 to $14.99					
$15 to $17.99	18	1			19
$18 to $20.99	15	1			16
$21 to $24.99	7				7
$25 and over	14				14
Totals	94	154	7	14	269

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	102	189	291
February	100	178	278
March	100	175	275
April	93	163	256
May	91	149	240
June	90	137	227
July	103	149	252
August	101	168	269
September	104	214	318
October	110	249	359
November	118	213	331
December	117	203	320

TABLE No. 14. BOXES, WOOD.

(5 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	6	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	2	
Under 18 years of age		
Totals	8	
Wage earners:		
18 years of age and over	126	51
Under 18 years of age	1	5
Totals	127	56

Salary and wage payments—annual:	
Officers, superintendents and managers	$11,700
Clerks, stenographers, salesmen, etc.	3,000
Wage earners (including piece workers)	98,290
Total	$113,090

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99		8		2	10
$7 to $7.99		29	1	1	31
$8 to $8.99		6		1	7
$9 to $9.99	10	4		1	15
$10 to $10.99	2	2			4
$11 to $11.99		1			1
$12 to $12.99	15	1			16
$13 to $13.99	14				14
$14 to $14.99					
$15 to $17.99	64				64
$18 to $20.99	11				11
$21 to $24.99	8				8
$25 and over	2				2
Totals	126	51	1	5	183

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	112	61	173
February	93	60	153
March	105	59	164
April	108	53	161
May	107	54	161
June	101	55	156
July	173	71	244
August	105	72	177
September	98	65	163
October	104	62	166
November	109	61	170
December	127	56	183

TABLE No. 15. BRASS, BRONZE AND COPPER PRODUCTS.

(8 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	11	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	5	1
Under 18 years of age		
Totals	16	2
Wage earners:		
18 years of age and over	79	
Under 18 years of age		
Totals	79	

Salary and wage payments—annual:	
Officers, superintendents and managers	$25,964
Clerks, stenographers, salesmen, etc.	5,941
Wage earners (including piece workers)	66,777
Total	$98,682

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1				1
$7 to $7.99	4				4
$8 to $8.99					
$9 to $9.99	5				5
$10 to $10.99	4				4
$11 to $11.99					
$12 to $12.99	7				7
$13 to $13.99	6				6
$14 to $14.99	4				4
$15 to $17.99	15				15
$18 to $20.99	12				12
$21 to $24.99	16				16
$25 and over	5				5
Totals	79				79

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	76		76
February	81		81
March	80		80
April	82		82
May	84		84
June	84		84
July	83		83
August	81		81
September	92		92
October	88		88
November	79		79
December	85		85

TABLE No. 16. BRICK AND TILE.

(10 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	15	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	24	4
Under 18 years of age		
Totals	39	4
Wage earners:		
18 years of age and over	261	
Under 18 years of age		
Totals	261	

Salary and wage payments—annual:	
Officers, superintendents and managers	$38,434
Clerks, stenographers, salesmen, etc	27,561
Wage earners (including piece workers)	166,622
Total	$232,617

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99	27				27
$11 to $11.99					
$12 to $12.99	66				66
$13 to $13.99	42				42
$14 to $14.99	3				3
$15 to $17.99	79				79
$18 to $20.99	26				26
$21 to $24.99	13				13
$25 and over	5				5
Totals	261				261

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	209		209
February	249		249
March	261		261
April	256		256
May	290		290
June	287		287
July	283		283
August	279		279
September	219		219
October	230		230
November	230		230
December	219		219

TABLE No. 17. BROOMS AND BRUSHES.

(5 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	4	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	2	
Under 18 years of age		
Totals	6	
Wage earners:		
18 years of age and over	50	
Under 18 years of age		
Totals	50	

Salary and wage payments—annual:	
Officers, superintendents and managers	$5,225
Clerks, stenographers, salesmen, etc.	1,660
Wage earners (including piece workers)	30,517
Total	$37,402

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99	1				1
$8 to $8.99					
$9 to $9.99	4				4
$10 to $10.99	1				1
$11 to $11.99					
$12 to $12.99	8				8
$13 to $13.99	3				3
$14 to $14.99	1				1
$15 to $17.99	14				14
$18 to $20.99	10				10
$21 to $24.99	4				4
$25 and over	4				4
Totals	50				50

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	50		50
February	50		50
March	50		50
April	50		50
May	50		50
June	50		50
July	50		50
August	50		50
September	50		50
October	50		50
November	50		50
December	50		50

TABLE No. 21. CANNING AND PRESERVING OF FRUITS AND VEGETABLES.

(15 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	19	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	28	7
Under 18 years of age		
Totals	47	7
Wage earners:		
18 years of age and over	180	251
Under 18 years of age	1	3
Totals	181	254

Salary and wage payments—annual:	
Officers, superintendents and managers	$33,600
Clerks, stenographers, salesmen, etc.	40,930
Wage earners (including piece workers)	148,589
Total	$223,119

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		2			2
$4 to $4.99		3			3
$5 to $5.99		2			2
$6 to $6.99		157			157
$7 to $7.99	1	13	1	3	18
$8 to $8.99		20			20
$9 to $9.99	6	32			38
$10 to $10.99	10	9			19
$11 to $11.99	6	4			10
$12 to $12.99	84	3			87
$13 to $13.99	22	2			24
$14 to $14.99	10	2			12
$15 to $17.99	18	2			20
$18 to $20.99	13				13
$21 to $24.99	5				5
$25 and over	5				5
Totals	180	251	1	3	435

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	206	197	403
February	231	160	391
March	139	122	261
April	105	83	188
May	121	268	389
June	72	137	209
July	89	133	222
August	175	416	591
September	195	256	451
October	194	267	461
November	196	80	276
December	238	314	552

TABLE No. 22. CARBONATED BEVERAGES.

(5 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	8	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	6	3
Under 18 years of age		
Totals	14	3
Wage earners:		
18 years of age and over	12	
Under 18 years of age		
Totals	12	

Salary and wage payments—annual:	
Officers, superintendents and managers	$10,192
Clerks, stenographers, salesmen, etc.	5,528
Wage earners (including piece workers)	7,758
Total	$23,478

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1				1
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99	1				1
$12 to $12.99	3				3
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	5				5
$18 to $20.99	2				2
$21 to $24.99					
$25 and over					
Totals	12				12

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	10		10
February	10		10
March	11		11
April	11		11
May	11		11
June	12		12
July	12		12
August	12		12
September	10		10
October	9		9
November	9		9
December	9		9

TABLE No. 23. CARRIAGES, WAGONS AND MATERIALS.

(3 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	5	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	3	2
Under 18 years of age		
Totals	8	2
Wage earners:		
18 years of age and over	35	
Under 18 years of age		
Totals	35	

Salary and wage payments—annual:	
Officers, superintendents and managers	$5,426
Clerks, stenographers, salesmen, etc.	2,234
Wage earners (including piece workers)	25,483
Total	$33,143

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99	1				1
$8 to $8.99					
$9 to $9.99	1				1
$10 to $10.99					
$11 to $11.99	1				1
$12 to $12.99	6				6
$13 to $13.99	4				4
$14 to $14.99	2				2
$15 to $17.99	4				4
$18 to $20.99	6				6
$21 to $24.99	9				9
$25 and over	1				1
Totals	35				35

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	31		31
February	28		28
March	29		29
April	36		36
May	34		34
June	34		34
July	35		35
August	34		34
September	34		34
October	50		50
November	47		47
December	45		45

TABLE No. 26. CHEMICALS (including chemical fertilizers).

(5 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	8	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	13	3
Under 18 years of age		
Totals	21	3
Wage earners:		
18 years of age and over	27	1
Under 18 years of age		
Totals	27	1

Salary and wage payments—annual:	
Officers, superintendents and managers	$25,104
Clerks, stenographers, salesmen, etc.	16,412
Wage earners (including piece workers)	19,565
Total	$61,081

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99		1			1
$9 to $9.99					
$10 to $10.99	1				1
$11 to $11.99					
$12 to $12.99	11				11
$13 to $13.99	6				6
$14 to $14.99	1				1
$15 to $17.99	3				3
$18 to $20.99					
$21 to $24.99					
$25 and over	5				5
Totals	27				28

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	27	1	28
February	29	1	30
March	30	1	30
April	31	1	32
May	25	1	26
June	25	1	26
July	24	1	25
August	25	1	26
September	25	1	26
October	24	1	25
November	25	1	26
December	27	1	28

TABLE No. 27. CLOTHING, MEN'S.

(9 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	19	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	16	21
Under 18 years of age	1	
Totals	36	22
Wage earners:		
18 years of age and over	76	570
Under 18 years of age	10	4
Totals	86	574

Salary and wage payments—annual:	
Officers, superintendents and managers	$50,588
Clerks, stenographers, salesmen, etc.	38,538
Wage earners (including piece workers)	292,759
Total	$381,885

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		35	1		36
$4 to $4.99		38			38
$5 to $5.99		31			31
$6 to $6.99	6	38	2		46
$7 to $7.99	2	48	2	2	54
$8 to $8.99	2	59	1		62
$9 to $9.99	2	66	1	1	70
$10 to $10.99	3	65	1	1	70
$11 to $11.99		37	1		38
$12 to $12.99	7	40	1		48
$13 to $13.99	4	28			32
$14 to $14.99	3	32			35
$15 to $17.99	11	41			52
$18 to $20.99	16	8			24
$21 to $24.99	12	3			15
$25 and over	8	1			9
Totals	76	570	10	4	660

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	67	422	489
February	75	425	500
March	69	415	484
April	75	473	548
May	79	547	626
June	80	655	735
July	82	644	726
August	86	574	660
September	81	575	656
October	86	590	676
November	90	564	654
December	89	575	664

TABLE No. 28. CLOTHING, WOMEN'S.

(12 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	15	5
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	18	14
Under 18 years of age	2	
Totals	35	19
Wage earners:		
18 years of age and over	34	212
Under 18 years of age		
Totals	34	212

Salary and wage payments—annual:	
Officers, superintendents and managers	$38,386
Clerks, stenographers, salesmen, etc.	20,958
Wage earners (including piece workers)	104,365
Total	$163,709

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		15			15
$4 to $4.99		15			15
$5 to $5.99	1	5			6
$6 to $6.99	1	34			35
$7 to $7.99	2	20			22
$8 to $8.99		24			24
$9 to $9.99		27			27
$10 to $10.99	1	25			26
$11 to $11.99		8			8
$12 to $12.99	1	15			16
$13 to $13.99		3			3
$14 to $14.99	5	6			11
$15 to $17.99	4	12			16
$18 to $20.99	7	1			8
$21 to $24.99	4	2			6
$25 and over	8				8
Totals	34	212			246

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	36	173	209
February	36	181	217
March	37	207	244
April	38	222	260
May	36	225	261
June	36	210	246
July	34	212	246
August	39	190	229
September	37	202	239
October	41	244	285
November	41	238	279
December	41	240	281

TABLE No. 29. COFFEE AND SPICE, ROASTING AND GRINDING.

(4 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	5	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	7	3
Under 18 years of age		
Totals	12	4
Wage earners:		
18 years of age and over	15	4
Under 18 years of age		
Totals	15	4

Salary and wage payments—annual:	
Officers, superintendents and managers	$14,670
Clerks, stenographers, salesmen, etc.	10,146
Wage earners (including piece workers)	14,027
Total	$38,843

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	1				1
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99		2			2
$8 to $8.99					
$9 to $9.99		1			1
$10 to $10.99	3				3
$11 to $11.99		1			1
$12 to $12.99					
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	3				3
$18 to $20.99	5				5
$21 to $24.99	2				2
$25 and over	1				1
Totals	15	4			19

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	15	3	18
February	15	3	18
March	15	3	18
April	15	4	19
May	15	4	19
June	15	3	18
July	15	4	19
August	15	4	19
September	15	4	19
October	15	3	18
November	15	3	18
December	15	4	19

TABLE No. 30. CONFECTIONERY.

(8 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	13	----------
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	23	2
Under 18 years of age	----------	----------
Totals	36	2
Wage earners:		
18 years of age and over	135	93
Under 18 years of age	----------	----------
Totals	135	93

Salary and wage payments—annual:	
Officers, superintendents and managers	$24,733
Clerks, stenographers, salesmen, etc.	25,011
Wage earners (including piece workers)	147,484
Total	$197,228

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	----------	4	----------	----------	4
$4 to $4.99	----------	3	----------	----------	3
$5 to $5.99	1	8	----------	----------	9
$6 to $6.99	4	10	----------	----------	14
$7 to $7.99	4	17	----------	----------	21
$8 to $8.99	3	14	----------	----------	17
$9 to $9.99	2	8	----------	----------	10
$10 to $10.99	7	6	----------	----------	13
$11 to $11.99	4	8	----------	----------	12
$12 to $12.99	6	12	----------	----------	18
$13 to $13.99	2	2	----------	----------	4
$14 to $14.99	27	----------	----------	----------	27
$15 to $17.99	47	1	----------	----------	48
$18 to $20.99	8	----------	----------	----------	8
$21 to $24.99	10	----------	----------	----------	10
$25 and over	10	----------	----------	----------	10
Totals	135	93	----------	----------	228

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	132	84	216
February	128	84	212
March	129	86	215
April	133	85	218
May	131	80	211
June	139	76	215
July	143	76	219
August	147	78	225
September	147	82	229
October	132	98	230
November	131	99	230
December	132	115	247

TABLE No. 32. ELECTRICAL MACHINERY, APPARATUS AND SUPPLIES.

(5 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	2	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	1	1
Under 18 years of age		
Totals	3	2
Wage earners:		
18 years of age and over	16	
Under 18 years of age		
Totals	16	

Salary and wage payments—annual:	
Officers, superintendents and managers	$7,000
Clerks, stenographers, salesmen, etc.	780
Wage earners (including piece workers)	6,656
Total	$14,436

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99	1				1
$11 to $11.99	1				1
$12 to $12.99	2				2
$13 to $13.99					
$14 to $14.99	1				1
$15 to $17.99	5				5
$18 to $20.99	4				4
$21 to $24.99	1				1
$25 and over	1				1
Totals	16				16

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	19		19
February	16		16
March	20		20
April	16		16
May	14		14
June	14		14
July	15		15
August	14		14
September	14		14
October	15		15
November	12		12
December	14		14

TABLE No. 34. ENGINES AND PUMPS—GAS AND GASOLINE.

(5 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	15	----------
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	27	7
Under 18 years of age	----------	----------
Totals	42	7
Wage earners:		
18 years of age and over	128	----------
Under 18 years of age	3	----------
Totals	131	----------

Salary and wage payments—annual:	
Officers, superintendents and managers	$26,640
Clerks, stenographers, salesmen, etc.	71,085
Wage earners (including piece workers)	113,082
Total	$210,807

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	----------	----------	1	----------	1
$4 to $4.99	----------	----------	----------	----------	----------
$5 to $5.99	2	----------	----------	----------	2
$6 to $6.99	----------	----------	1	----------	1
$7 to $7.99	4	----------	----------	----------	4
$8 to $8.99	1	----------	1	----------	2
$9 to $9.99	1	----------	----------	----------	1
$10 to $10.99	5	----------	----------	----------	5
$11 to $11.99	1	----------	----------	----------	1
$12 to $12.99	6	----------	----------	----------	6
$13 to $13.99	3	----------	----------	----------	3
$14 to $14.99	6	----------	----------	----------	6
$15 to $17.99	27	----------	----------	----------	27
$18 to $20.99	57	----------	----------	----------	57
$21 to $24.99	14	----------	----------	----------	14
$25 and over	1	----------	----------	----------	1
Totals	128	----------	3	----------	131

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	140	----------	140
February	137	----------	137
March	118	----------	118
April	132	----------	132
May	131	----------	131
June	132	----------	132
July	133	----------	133
August	132	----------	132
September	113	----------	113
October	116	----------	116
November	113	----------	113
December	131	----------	131

TABLE No. 37. FLOUR MILL AND GRIST MILL PRODUCTS.

(5 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	15	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	37	12
Under 18 years of age	16	5
Totals	68	17
Wage earners:		
18 years of age and over	98	8
Under 18 years of age	6	
Totals	104	8

Salary and wage payments—annual:	
Officers, superintendents and managers	$56,000
Clerks, stenographers, salesmen, etc.	74,107
Wage earners (including piece workers)	101,214
Total	$231,321

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99		1	2		3
$7 to $7.99		3			3
$8 to $8.99		1	2		3
$9 to $9.99		1	2		3
$10 to $10.99	1	1			2
$11 to $11.99					
$12 to $12.99	3	1			4
$13 to $13.99	2				2
$14 to $14.99					
$15 to $17.99	54				54
$18 to $20.99	24				24
$21 to $24.99	14				14
$25 and over					
Totals	98	8	6		112

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	111	9	120
February	103	10	113
March	101	9	110
April	95	9	104
May	104	8	112
June	101	4	105
July	104	5	109
August	110	9	119
September	102	7	109
October	102	7	109
November	118	9	127
December	115	9	124

TABLE No. 38. FOOD PREPARATIONS.

(9 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	7	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	4	
Under 18 years of age		
Totals	11	
Wage earners:		
18 years of age and over	28	13
Under 18 years of age	1	
Totals	29	13

Salary and wage payments—annual:	
Officers, superintendents and managers	$12,007
Clerks, stenographers, salesmen, etc.	5,700
Wage earners (including piece workers)	21,245
Total	$38,952

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	1	1			2
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1	8			9
$7 to $7.99	1				1
$8 to $8.99		3			3
$9 to $9.99	1	1			2
$10 to $10.99	3		1		4
$11 to $11.99	4				4
$12 to $12.99	6				6
$13 to $13.99	1				1
$14 to $14.99	1				1
$15 to $17.99	3				3
$18 to $20.99	3				3
$21 to $24.99	2				2
$25 and over	1				1
Totals	28	13	1		42

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	25	12	37
February	26	13	39
March	26	13	39
April	29	13	42
May	29	13	42
June	29	12	41
July	29	7	36
August	29	7	36
September	29	8	37
October	29	8	37
November	29	8	37
December	29	8	37

TABLE No. 39. FOUNDRY AND MACHINE SHOP PRODUCTS.

(32 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	47	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	67	15
Under 18 years of age		
Totals	114	15
Wage earners:		
18 years of age and over	641	
Under 18 years of age	2	
Totals	643	

Salary and wage payments—annual:	
Officers, superintendents and managers	$101,955
Clerks, stenographers, salesmen, etc.	75,654
Wage earners (including piece workers)	517,952
Total	$695,561

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99	1				1
$5 to $5.99	2				2
$6 to $6.99	5		1		6
$7 to $7.99	10				10
$8 to $8.99	3				3
$9 to $9.99	12		1		13
$10 to $10.99	7				7
$11 to $11.99	3				3
$12 to $12.99	24				24
$13 to $13.99	62				62
$14 to $14.99	57				57
$15 to $17.99	106				106
$18 to $20.99	147				147
$21 to $24.99	137				137
$25 and over	65				65
Totals	641		2		643

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	590		590
February	599		599
March	603		603
April	643		643
May	623		623
June	652		652
July	634		634
August	662		662
September	637		637
October	646		646
November	638		638
December	637		637

TABLE No. 40. FURNITURE, BANK AND STORE FIXTURES, ETC.

(19 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	32	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	37	14
Under 18 years of age	1	
Totals	70	15
Wage earners:		
18 years of age and over	400	
Under 18 years of age	10	
Totals	410	

Salary and wage payments—annual:	
Officers, superintendents and managers	$51,174
Clerks, stenographers, salesmen, etc.	56,100
Wage earners (including piece workers)	280,478
Total	$387,752

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	14		8		22
$7 to $7.99	32		2		34
$8 to $8.99	12				12
$9 to $9.99	7				7
$10 to $10.99	10				10
$11 to $11.99	3				3
$12 to $12.99	23				23
$13 to $13.99	19				19
$14 to $14.99	19				19
$15 to $17.99	60				60
$18 to $20.99	90				90
$21 to $24.99	91				91
$25 and over	20				20
Totals	400		10		410

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	329		329
February	340		340
March	338		338
April	393		393
May	366		366
June	363		363
July	410		410
August	454		454
September	351		351
October	344		344
November	383		383
December	386		386

TABLE No. 41. GAS (in containers).

(3 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	5	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	8	6
Under 18 years of age		
Totals	13	6
Wage earners:		
18 years of age and over	24	
Under 18 years of age		
Totals	24	

Salary and wage payments—annual:	
Officers, superintendents and managers	$7,950
Clerks, stenographers, salesmen, etc.	13,505
Wage earners (including piece workers)	19,287
Total	$40,742

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	1				1
$13 to $13.99	5				5
$14 to $14.99					
$15 to $17.99	10				10
$18 to $20.99	6				6
$21 to $24.99	1				1
$25 and over	1				1
Totals	24				24

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	24		24
February	23		23
March	23		23
April	23		23
May	22		22
June	23		23
July	23		23
August	24		24
September	25		25
October	24		24
November	25		25
December	24		24

TABLE No. 42. GAS AND ELECTRIC FIXTURES.

(8 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	23	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	27	6
Under 18 years of age	1	
Totals	51	6
Wage earners:		
18 years of age and over	74	
Under 18 years of age	3	
Totals	77	

Salary and wage payments—annual:	
Officers, superintendents and managers	$47,391
Clerks, stenographers, salesmen, etc.	40,307
Wage earners (including piece workers)	62,126
Total	$149,824

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	3		1		4
$7 to $7.99	3				3
$8 to $8.99	3		1		4
$9 to $9.99	2				2
$10 to $10.99	3		1		4
$11 to $11.99					
$12 to $12.99	4				4
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	11				11
$18 to $20.99	7				7
$21 to $24.99	30				30
$25 and over	8				8
Totals	74		3		77

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	77		77
February	77		77
March	79		79
April	77		77
May	68		68
June	66		66
July	65		65
August	63		63
September	69		69
October	79		79
November	81		81
December	95		95

TABLE No. 43. GLASS, CUTTING AND ORNAMENTING (including mirrors).

(5 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	8	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	5	1
Under 18 years of age		
Totals	13	1
Wage earners:		
18 years of áge and over	31	
Under 18 years of age	1	
Totals	32	

Salary and wage payments—annual:	
Officers, superintendents and managers	$14,176
Clerks, stenographers, salesmen, etc.	6,756
Wage earners (including piece workers)	27,043
Total	$47,975

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99	1		1		2
$5 to $5.99					
$6 to $6.99	1				1
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99	2				2
$12 to $12.99	3				3
$13 to $13.99					
$14 to $14.99	2				2
$15 to $17.99	5				5
$18 to $20.99	5				5
$21 to $24.99	11				11
$25 and over	1				1
Totals	31		1		32

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	32		32
February	33		33
March	29		29
April	30		30
May	28		28
June	30		30
July	30		30
August	27		27
September	31		31
October	29		29
November	31		31
December	33		33

TABLE No. 46. HATS AND CAPS, MEN'S.

(4 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	4	1
Clerks, stenographers, salesmen, etc.:		
18 years of age or over	5	3
Under 18 years of age		
Totals	9	4
Wage earners:		
18 years of age and over	14	12
Under 18 years of age		
Totals	14	12

Salary and wage payments—annual:	
Officers, superintendents and managers	$9,505
Clerks, stenographers, salesmen, etc.	7,406
Wage earners (including piece workers)	13,378
Total	$30,289

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		1			1
$4 to $4.99		1			1
$5 to $5.99					
$6 to $6.99		1			1
$7 to $7.99		1			1
$8 to $8.99		2			2
$9 to $9.99					
$10 to $10.99	2				2
$11 to $11.99		1			1
$12 to $12.99		3			3
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	1	2			3
$18 to $20.99	3				3
$21 to $24.99	3				3
$25 and over	5				5
Totals	14	12			26

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	10	7	17
February	14	12	26
March	12	16	28
April	9	11	20
May	8	9	17
June	7	7	14
July	8	8	16
August	11	10	21
September	11	16	27
October	18	14	32
November	16	15	31
December	17	11	28

TABLE No. 47. ICE, MANUFACTURED.

(8 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	19	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	16	1
Under 18 years of age		
Totals	35	1
Wage earners:		
18 years of age and over	191	
Under 18 years of age		
Totals	191	

Salary and wage payments—annual:	
Officers, superintendents and managers	$34,158
Clerks, stenographers, salesmen, etc.	16,818
Wage earners (including piece workers)	179,388
Total	$230,364

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	1				1
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	3				3
$13 to $13.99	3				3
$14 to $14.99					
$15 to $17.99	61				61
$18 to $20.99	69				69
$21 to $24.99	30				30
$25 and over	24				24
Totals	191				191

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	157		157
February	169		169
March	196		196
April	200		200
May	191		191
June	204		204
July	218		218
August	242		242
September	241		241
October	205		205
November	190		190
December	178		178

TABLE No. 49. IRON AND STEEL, STRUCTURAL AND ORNAMENTAL.

(9 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	29	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	101	16
Under 18 years of age	2	
Totals	132	16
Wage earners:		
18 years of age and over	850	
Under 18 years of age	6	
Totals	856	

Salary and wage payments—annual:	
Officers, superintendents and managers	$79,020
Clerks, stenographers, salesmen, etc.	100,288
Wage earners (including piece workers)	609,981
Total	$789,289

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99			1		1
$5 to $5.99	1		3		4
$6 to $6.99	1		2		3
$7 to $7.99	3				3
$8 to $8.99	2				2
$9 to $9.99	7				7
$10 to $10.99	8				8
$11 to $11.99	14				14
$12 to $12.99	161				161
$13 to $13.99	93				93
$14 to $14.99	90				90
$15 to $17.99	172				172
$18 to $20.99	130				130
$21 to $24.99	110				110
$25 and over	58				58
Totals	850		6		856

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	1,011		1,011
February	909		909
March	802		802
April	842		842
May	922		922
June	969		969
July	933		933
August	924		924
September	856		856
October	711		711
November	768		768
December	904		904

TABLE No. 50. JEWELRY.

(7 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	3	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	3	5
Under 18 years of age	1	
Totals	7	5
Wage earners:		
18 years of age and over	51	4
Under 18 years of age		
Totals	51	4

Salary and wage payments—annual:	
Officers, superintendents and managers	$4,160
Clerks, stenographers, salesmen, etc.	4,769
Wage earners (including piece workers)	51,716
Total	$60,645

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99		1			1
$6 to $6.99	1				1
$7 to $7.99					
$8 to $8.99	1				1
$9 to $9.99	2				2
$10 to $10.99		1			1
$11 to $11.99	1				1
$12 to $12.99	6	1			7
$13 to $13.99	2				2
$14 to $14.99	3				3
$15 to $17.99	11				11
$18 to $20.99	5	1			6
$21 to $24.99	7				7
$25 and over	12				12
Totals	51	4			55

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	39	4	43
February	46	3	49
March	49	6	55
April	50	6	56
May	49	4	53
June	51	4	55
July	53	3	56
August	60	4	64
September	62	5	67
October	59	5	64
November	59	4	63
December	59	4	63

TABLE No. 52. LAUNDRIES.

(20 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	49	3
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	150	213
Under 18 years of age	1	
Totals	200	216
Wage earners:		
18 years of age and over	657	1,527
Under 18 years of age		3
Totals	657	1,530

Salary and wage payments—annual:	
Officers, superintendents and managers	$115,096
Clerks, stenographers, salesmen, etc.	259,022
Wage earners (including piece workers)	1,136,544
Total	$1,510,662

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99		27			27
$6 to $6.99	10	121			131
$7 to $7.99	57	494		3	554
$8 to $8.99	43	286			329
$9 to $9.99	39	267			306
$10 to $10.99	47	121			168
$11 to $11.99	8	31			39
$12 to $12.99	83	90			173
$13 to $13.99	24	18			42
$14 to $14.99	17	19			36
$15 to $17.99	161	40			201
$18 to $20.99	102	11			113
$21 to $24.99	29	2			31
$25 and over	37				37
Totals	657	1,527		3	2,187

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	649	1,496	2,145
February	640	1,497	2,137
March	645	1,495	2,140
April	655	1,501	2,156
May	636	1,458	2,094
June	633	1,488	2,121
July	672	1,576	2,248
August	679	1,546	2,225
September	672	1,526	2,198
October	662	1,557	2,219
November	661	1,509	2,170
December	657	1,530	2,187

TABLE No. 53. LEATHER GOODS.

(6 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	14	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	28	9
Under 18 years of age		
Totals	42	9
Wage earners:		
18 years of age and over	43	12
Under 18 years of age	2	
Totals	45	12

Salary and wage payments—annual:	
Officers, superintendents and managers	$25,260
Clerks, stenographers, salesmen, etc.	38,895
Wage earners (including piece workers)	39,190
Total	$103,345

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99	1	1			2
$6 to $6.99		3	1		4
$7 to $7.99		2			2
$8 to $8.99	1	1	1		3
$9 to $9.99		3			3
$10 to $10.99	3	1			4
$11 to $11.99		1			1
$12 to $12.99	1				1
$13 to $13.99	4				4
$14 to $14.99	4				4
$15 to $17.99	9				9
$18 to $20.99	12				12
$21 to $24.99	7				7
$25 and over	1				1
Totals	43	12	2		57

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	53	12	65
February	48	9	57
March	50	10	60
April	44	8	52
May	45	9	54
June	44	9	53
July	44	9	53
August	44	9	53
September	42	10	52
October	41	8	49
November	45	12	57
December	60	16	76

TABLE No. 55. LIQUORS, MALT.

(3 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	18	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	44	4
Under 18 years of age		
Totals	62	4
Wage earners:		
18 years of age and over	324	
Under 18 years of age		
Totals	324	

Salary and wage payments—annual:	
Officers, superintendents and managers	$87,300
Clerks, stenographers, salesmen, etc.	59,641
Wage earners (including piece workers)	362,769
Total	$509,710

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	1				1
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	1				1
$18 to $20.99	148				148
$21 to $24.99	88				88
$25 and over	86				86
Totals	324				324

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	324		324
February	314		314
March	312		312
April	325		325
May	323		323
June	337		337
July	332		332
August	329		329
September	330		330
October	317		317
November	309		309
December	312		312

TABLE No. 57. LUMBER INDUSTRY—PLANING MILLS.

(7 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	10	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	30	2
Under 18 years of age		
Totals	40	2
Wage earners:		
18 years of age and over	291	
Under 18 years of age	2	
Totals	293	

Salary and wage payments—annual:	
Officers, superintendents and managers	$24,320
Clerks, stenographers, salesmen, etc	58,550
Wage earners (including piece workers)	225,540
Total	$308,410

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1				1
$7 to $7.99	1				1
$8 to $8.99			1		1
$9 to $9.99	8				8
$10 to $10.99	10		1		11
$11 to $11.99	3				3
$12 to $12.99	6				6
$13 to $13.99	25				25
$14 to $14.99					
$15 to $17.99	113				113
$18 to $20.99	64				64
$21 to $24.99	49				49
$25 and over	11				11
Totals	291		2		293

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	283		283
February	310		310
March	325		325
April	330		330
May	273		273
June	280		280
July	235		235
August	290		290
September	338		338
October	310		310
November	307		307
December	340		340

TABLE No. 58. LUMBER INDUSTRY—SASH AND DOOR MILLS AND HOUSE FINISH.

(16 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	24	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	40	10
Under 18 years of age		
Totals	64	10
Wage earners:		
18 years of age and over	539	
Under 18 years of age	20	
Totals	559	

Salary and wage payments—annual:	
Officers, superintendents and managers	$42,349
Clerks, stenographers, salesmen, etc.	97,309
Wage earners (including piece workers)	515,779
Total	$655,437

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99			1		1
$7 to $7.99			2		2
$8 to $8.99					
$9 to $9.99	4		2		6
$10 to $10.99	16		15		31
$11 to $11.99	4				4
$12 to $12.99	28				28
$13 to $13.99	83				83
$14 to $14.99	82				82
$15 to $17.99	71				71
$18 to $20.99	155				155
$21 to $24.99	88				88
$25 and over	8				8
Totals	539		20		559

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	559		559
February	576		576
March	601		601
April	607		607
May	685		685
June	744		744
July	582		582
August	488		488
September	457		457
October	478		478
November	447		447
December	488		488

TABLE No. 61. MARBLE AND STONE WORK.

(4 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	2	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over		
Under 18 years of age		
Totals	2	
Wage earners:		
18 years of age and over	20	
Under 18 years of age		
Totals	20	

Salary and wage payments—annual:	
Officers, superintendents and managers	$6,300
Clerks, stenographers, salesmen, etc.	
Wage earners (including piece workers)	20,051
Total	$26,351

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99					
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	1				1
$18 to $20.99	1				1
$21 to $24.99	6				6
$25 and over	12				12
Totals	20				20

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	20		20
February	19		19
March	19		19
April	41		41
May	39		39
June	29		29
July	11		11
August	10		10
September	9		9
October	5		5
November	18		18
December	16		16

TABLE No. 62. MATTRESSES, PILLOWS AND BEDDING.

(5 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	9	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	8	5
Under 18 years of age		
Totals	17	5
Wage earners:		
18 years of age and over	94	26
Under 18 years of age	2	
Totals	96	26

Salary and wage payments—annual:	
Officers, superintendents and managers	$22,600
Clerks, stenographers, salesmen, etc.	17,359
Wage earners (including piece workers)	79,702
Total	$119,661

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99		1	1		2
$6 to $6.99	3				3
$7 to $7.99	2	6	1		9
$8 to $8.99		4			4
$9 to $9.99	3	2			5
$10 to $10.99	3	2			5
$11 to $11.99	14	1			15
$12 to $12.99	8	3			11
$13 to $13.99	11	1			12
$14 to $14.99	1	5			6
$15 to $17.99	23	1			24
$18 to $20.99	13				13
$21 to $24.99	5				5
$25 and over	8				8
Totals	94	26	2		122

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	108	23	131
February	99	24	123
March	102	24	126
April	98	20	118
May	96	23	119
June	97	20	117
July	101	23	124
August	96	21	117
September	92	20	112
October	91	24	115
November	96	21	117
December	96	26	122

TABLE No. 63. METAL SIGNS, STENCILS AND RUBBER STAMPS.

(4 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	10	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	5	1
Under 18 years of age	2	
Totals	17	2
Wage earners:		
18 years of age and over	31	13
Under 18 years of age		
Totals	31	13

Salary and wage payments—annual:	
Officers, superintendents and managers	$13,924
Clerks, stenographers, salesmen, etc.	6,907
Wage earners (including piece workers)	27,937
Total	$48,768

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99		2			2
$7 to $7.99		2			2
$8 to $8.99		5			5
$9 to $9.99	1	2			3
$10 to $10.99					
$11 to $11.99	6	2			8
$12 to $12.99	4				4
$13 to $13.99	7				7
$14 to $14.99	2				2
$15 to $17.99	4				4
$18 to $20.99	4				4
$21 to $24.99	3				3
$25 and over					
Totals	31	13			44

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	22	10	32
February	18	7	25
March	17	5	22
April	19	5	24
May	20	9	29
June	16	11	27
July	16	6	22
August	17	7	24
September	31	13	44
October	67	32	99
November	78	34	112
December	63	41	104

TABLE No. 65. OIL STOVES AND OIL BURNING EQUIPMENT.

(5 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	2	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	9	1
Under 18 years of age		
Totals	11	1
Wage earners:		
18 years of age and over	23	
Under 18 years of age		
Totals	23	

Salary and wage payments—annual:	
Officers, superintendents and managers	$3,260
Clerks, stenographers, salesmen, etc.	5,573
Wage earners (including piece workers)	21,172
Total	$30,005

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99	1				1
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	2				2
$13 to $13.99	1				1
$14 to $14.99	1				1
$15 to $17.99	4				4
$18 to $20.99	6				6
$21 to $24.99	7				7
$25 and over	1				1
Totals	23				23

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	28		28
February	25		25
March	25		25
April	21		21
May	19		19
June	18		18
July	19		19
August	18		18
September	20		20
October	24		24
November	23		23
December	23		23

TABLE No. 66. OIL WELL TOOLS AND SUPPLIES.

(5 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	14	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	12	9
Under 18 years of age		
Totals	26	9
Wage earners:		
18 years of age and over	147	
Under 18 years of age		
Totals	147	

Salary and wage payments—annual:	
Officers, superintendents and managers	$29,880
Clerks, stenographers, salesmen, etc.	23,077
Wage earners (including piece workers)	104,658
Total	$157,615

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	2				2
$7 to $7.99					
$8 to $8.99	5				5
$9 to $9.99	2				2
$10 to $10.99	4				4
$11 to $11.99					
$12 to $12.99	8				8
$13 to $13.99	13				13
$14 to $14.99	18				18
$15 to $17.99	24				24
$18 to $20.99	21				21
$21 to $24.99	31				31
$25 and over	19				19
Totals	147				147

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	128		128
February	128		128
March	154		154
April	149		149
May	146		146
June	167		167
July	151		151
August	157		157
September	153		153
October	153		153
November	149		149
December	147		147

TABLE No. 67. PACKING AND PROCESSING DRIED FRUITS.

(3 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	4	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	7	2
Under 18 years of age		
Totals	11	2
Wage earners:		
18 years of age and over	105	83
Under 18 years of age		1
Totals	105	84

Salary and wage payments—annual:	
Officers, superintendents and managers	$12,320
Clerks, stenographers, salesmen, etc.	10,360
Wage earners (including piece workers)	43,273
Total	$65,953

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99		1		1	2
$6 to $6.99		43			43
$7 to $7.99	25	36			61
$8 to $8.99		1			1
$9 to $9.99		1			1
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	13	1			14
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	66				66
$18 to $20.99	1				1
$21 to $24.99					
$25 and over					
Totals	105	83		1	189

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	5	16	21
February	6	19	25
March	4	5	9
April			
May			
June			
July	41	68	109
August	79	119	198
September	111	140	251
October	117	108	225
November	105	84	189
December	73	24	97

TABLE No. 68. PAINTS AND VARNISHES.

(7 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	10	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	31	6
Under 18 years of age		
Totals	41	6
Wage earners:		
18 years of age and over	42	3
Under 18 years of age	1	
Totals	43	3

Salary and wage payments—annual:	
Officers, superintendents and managers	$22,785
Clerks, stenographers, salesmen, etc.	43,180
Wage earners (including piece workers)	30,028
Total	$95,993

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99			1		1
$6 to $6.99					
$7 to $7.99		1			1
$8 to $8.99		1			1
$9 to $9.99	14	1			15
$10 to $10.99					
$11 to $11.99	1				1
$12 to $12.99	8				8
$13 to $13.99	4				4
$14 to $14.99					
$15 to $17.99	6				6
$18 to $20.99	8				8
$21 to $24.99	1				1
$25 and over					
Totals	42	3	1		46

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	40	2	42
February	40	2	42
March	40	2	42
April	41	2	43
May	40	3	43
June	40	3	43
July	40	3	43
August	42	3	45
September	41	3	44
October	41	3	44
November	42	3	45
December	43	3	46

TABLE No. 72. PHOTO-ENGRAVING, ELECTROTYPING AND STEREOTYPING.

(9 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	15	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	10	6
Under 18 years of age		
Totals	25	6
Wage earners:		
18 years of age and over	48	4
Under 18 years of age	3	1
Totals	51	5

Salary and wage payments—annual:	
Officers, superintendents and managers	$28,564
Clerks, stenographers, salesmen, etc.	12,802
Wage earners (including piece workers)	48,264
Total	$89,630

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99			1		1
$6 to $6.99	1		1		2
$7 to $7.99		1			1
$8 to $8.99	1		1		2
$9 to $9.99	1	2			3
$10 to $10.99	4				4
$11 to $11.99	1			1	2
$12 to $12.99	1				1
$13 to $13.99	3				3
$14 to $14.99					
$15 to $17.99	2				2
$18 to $20.99	3				3
$21 to $24.99	15				15
$25 and over	16	1			17
Totals	48	4	3	1	56

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	51	4	55
February	52	4	56
March	52	4	56
April	49	5	54
May	49	5	54
June	49	5	54
July	49	5	54
August	48	5	53
September	48	5	53
October	48	4	52
November	48	4	52
December	48	5	53

TABLE No. 73. PRINTING AND PUBLISHING.

(69 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	104	4
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	414	57
Under 18 years of age	4	
Totals	522	61
Wage earners:		
18 years of age and over	749	171
Under 18 years of age	32	6
Totals	781	177

Salary and wage payments—annual:	
Officers, superintendents and managers	$233,134
Clerks, stenographers, salesmen, etc.	420,300
Wage earners (including piece workers)	850,298
Total	$1,503,732

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4		7			7
$4 to $4.99	4		1		5
$5 to $5.99	3	3	1	1	8
$6 to $6.99	5	10	7	1	23
$7 to $7.99	10	6	13	2	31
$8 to $8.99	8	16	6		30
$9 to $9.99	17	42	3	2	64
$10 to $10.99	16	40	1		57
$11 to $11.99	4	12			16
$12 to $12.99	35	9			44
$13 to $13.99	19	4			23
$14 to $14.99	31	6			37
$15 to $17.99	82	6			88
$18 to $20.99	80	5			85
$21 to $24.99	130	2			132
$25 and over	305	3			308
Totals	749	171	32	6	958

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	806	175	981
February	783	160	943
March	788	163	951
April	783	158	941
May	808	182	990
June	787	187	974
July	791	156	947
August	757	157	914
September	776	161	937
October	782	167	949
November	778	172	950
December	815	188	1,003

TABLE No. 74. ROCK QUARRYING AND CRUSHING.

(6 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	8	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	4	1
Under 18 years of age		
Totals	12	1
Wage earners:		
18 years of age and over	47	
Under 18 years of age	1	
Totals	48	

Salary and wage payments—annual:	
Officers, superintendents and managers	$19,183
Clerks, stenographers, salesmen, etc.	6,049
Wage earners (including piece workers)	55,148
Total	$80,380

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4			1		1
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99					
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	2				2
$13 to $13.99	6				6
$14 to $14.99	1				1
$15 to $17.99	15				15
$18 to $20.99	11				11
$21 to $24.99	3				3
$25 and over	9				9
Totals	47		1		48

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	68		68
February	68		68
March	54		54
April	61		61
May	59		59
June	40		40
July	31		31
August	45		45
September	49		49
October	48		48
November	45		45
December	47		47

TABLE No. 75. ROOFING MATERIALS AND BUILDING PAPER.

(4 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	17	----------
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	56	7
Under 18 years of age	----------	----------
Totals	73	7
Wage earners:		
18 years of age and over	180	----------
Under 18 years of age	----------	----------
Totals	180	----------

Salary and wage payments—annual:	
Officers, superintendents and managers	$53,793
Clerks, stenographers, salesmen, etc	70,598
Wage earners (including piece workers)	132,144
Total	$256,535

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	----------	----------	----------	----------	----------
$4 to $4.99	----------	----------	----------	----------	----------
$5 to $5.99	----------	----------	----------	----------	----------
$6 to $6.99	----------	----------	----------	----------	----------
$7 to $7.99	----------	----------	----------	----------	----------
$8 to $8.99	1	----------	----------	----------	1
$9 to $9.99	----------	----------	----------	----------	----------
$10 to $10.99	20	----------	----------	----------	20
$11 to $11.99	1	----------	----------	----------	1
$12 to $12.99	17	----------	----------	----------	17
$13 to $13.99	3	----------	----------	----------	3
$14 to $14.99	----------	----------	----------	----------	----------
$15 to $17.99	54	----------	----------	----------	54
$18 to $20.99	65	----------	----------	----------	65
$21 to $24.99	18	----------	----------	----------	18
$25 and over	1	----------	----------	----------	1
Totals	180	----------	----------	----------	180

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	169	----------	169
February	174	----------	174
March	180	----------	180
April	183	----------	183
May	164	----------	164
June	165	----------	165
July	141	----------	141
August	155	----------	155
September	158	----------	158
October	191	----------	191
November	194	----------	194
December	190	----------	190

TABLE No. 76. RUBBER GOODS—MECHANICAL, AND RUBBER SPECIALTIES.

(3 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	1	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	11	6
Under 18 years of age		
Totals	12	6
Wage earners:		
18 years of age and over	32	10
Under 18 years of age		
Totals	32	10

Salary and wage payments—annual:	
Officers, superintendents and managers	$600
Clerks, stenographers, salesmen, etc.	4,787
Wage earners (including piece workers)	22,869
Total	$28,256

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99		3			3
$6 to $6.99		1			1
$7 to $7.99	1	3			4
$8 to $8.99	2	2			4
$9 to $9.99	4	1			5
$10 to $10.99					
$11 to $11.99	3				3
$12 to $12.99	8				8
$13 to $13.99					
$14 to $14.99	4				4
$15 to $17.99	5				5
$18 to $20.99	3				3
$21 to $24.99	2				2
$25 and over					
Totals	32	10			42

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	32	10	42
February	33	10	43
March	37	10	47
April	36	10	46
May	36	10	46
June	39	10	49
July	35	9	44
August	31	9	40
September	29	9	38
October	29	9	38
November	28	9	37
December	16	8	24

TABLE No. 78. SHEET METAL PRODUCTS (not including tin cans).

(17 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	25	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	40	9
Under 18 years of age	1	
Totals	66	9
Wage earners:		
18 years of age and over	203	9
Under 18 years of age	1	
Totals	204	9

Salary and wage payments—annual:	
Officers, superintendents and managers	$76,570
Clerks, stenographers, salesmen, etc.	54,445
Wage earners (including piece workers)	173,430
Total	$304,445

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99			1		1
$6 to $6.99	1				1
$7 to $7.99	1	5			6
$8 to $8.99		1			1
$9 to $9.99	3	1			4
$10 to $10.99	3	2			5
$11 to $11.99	5				5
$12 to $12.99	14				14
$13 to $13.99	15				15
$14 to $14.99	4				4
$15 to $17.99	38				38
$18 to $20.99	31				31
$21 to $24.99	47				47
$25 and over	41				41
Totals	203	9	1		213

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	233	2	235
February	217	2	219
March	216	5	221
April	212	13	225
May	195	5	200
June	179	4	183
July	185	4	189
August	219	4	223
September	213	3	216
October	230	3	233
November	202	3	205
December	175	9	184

TABLE No. 80. SLAUGHTERING AND MEAT PACKING.

(5 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	12	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	169	14
Under 18 years of age	2	
Totals	183	14
Wage earners:		
18 years of age and over	722	37
Under 18 years of age	6	1
Totals	728	38

Salary and wage payments—annual:	
Officers, superintendents and managers	$44,574
Clerks, stenographers, salesmen, etc.	211,161
Wage earners (including piece workers)	513,022
Total	$768,757

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	37				37
$4 to $4.99	9	1			10
$5 to $5.99	1	5			6
$6 to $6.99	5	21	5	1	32
$7 to $7.99	1	4	1		6
$8 to $8.99	9				9
$9 to $9.99	7	2			9
$10 to $10.99	90				90
$11 to $11.99	12				12
$12 to $12.99	138				138
$13 to $13.99	94	4			98
$14 to $14.99	14				14
$15 to $17.99	123				123
$18 to $20.99	103				103
$21 to $24.99	53				53
$25 and over	26				26
Totals	722	37	6	1	766

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	865	33	898
February	648	32	680
March	776	21	797
April	738	39	777
May	728	38	766
June	727	34	761
July	735	26	761
August	778	27	805
September	763	57	820
October	649	37	686
November	678	29	707
December	856	30	886

TABLE No. 81. SMELTING AND REFINING.

(3 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	4	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	2	1
Under 18 years of age		
Totals	6	1
Wage earners:		
18 years of age and over	62	
Under 18 years of age		
Totals	62	

Salary and wage payments—annual:	
Officers, superintendents and managers	$7,575
Clerks, stenographers, salesmen, etc.	1,085
Wage earners (including piece workers)	34,396
Total	$43,056

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99					
$8 to $8.99					
$9 to $9.99	34				34
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	6				6
$13 to $13.99	3				3
$14 to $14.99					
$15 to $17.99	3				3
$18 to $20.99	2				2
$21 to $24.99	8				8
$25 and over	6				6
Totals	62				62

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	5		5
February	5		5
March	5		5
April	5		5
May	91		91
June	70		70
July	42		42
August	85		85
September	64		64
October	87		87
November	62		62
December	100		100

TABLE No 83. STOVES AND FURNACES (not including oil stoves).

(4 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	1	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	4	1
Under 18 years of age		
Totals	5	1
Wage earners:		
18 years of age and over	36	
Under 18 years of age	2	
Totals	38	

Salary and wage payments—annual:	
Officers, superintendents and managers	$1,500
Clerks, stenographers, salesmen, etc.	5,675
Wage earners (including piece workers)	26,045
Total	$33,220

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99			2		2
$7 to $7.99					
$8 to $8.99					
$9 to $9.99	2				2
$10 to $10.99					
$11 to $11.99					
$12 to $12.99	1				1
$13 to $13.99					
$14 to $14.99					
$15 to $17.99	4				4
$18 to $20.99	16				16
$21 to $24.99	8				8
$25 and over	5				5
Totals	36		2		38

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	32		32
February	28		28
March	41		41
April	32		32
May	27		27
June	41		41
July	23		23
August	22		22
September	24		24
October	36		36
November	41		41
December	38		38

TABLE No. 86. TOBACCO MANUFACTURES.

(11 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	6	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	6	
Under 18 years of age		
Totals	12	
Wage earners:		
18 years of age and over	81	30
Under 18 years of age	3	6
Totals	84	36

Salary and wage payments—annual:	
Officers, superintendents and managers	$7,465
Clerks, stenographers, salesmen, etc.	11,365
Wage earners (including piece workers)	74,079
Total	$92,909

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99			1	6	7
$7 to $7.99	1				1
$8 to $8.99	2	10	2		14
$9 to $9.99	1	5			6
$10 to $10.99	7	3			10
$11 to $11.99	1				1
$12 to $12.99	2	1			3
$13 to $13.99	3				3
$14 to $14.99	2				2
$15 to $17.99	25	4			29
$18 to $20.99	24	2			26
$21 to $24.99	11	3			14
$25 and over	2	2			4
Totals	81	30	3	6	120

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	83	37	120
February	77	34	111
March	82	36	118
April	80	35	115
May	82	39	121
June	87	40	127
July	85	36	121
August	76	32	108
September	81	35	116
October	79	34	113
November	84	35	119
December	85	35	120

TABLE No. 87. TRUNKS, VALISES, ETC.

(3 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	2	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	1	1
Under 18 years of age		
Totals	3	1
Wage earners:		
18 years of age and over	20	3
Under 18 years of age		
Totals	20	3

Salary and wage payments—annual:	
Officers, superintendents and managers	$3,930
Clerks, stenographers, salesmen, etc.	1,664
Wage earners (including piece workers)	16,304
Total	$21,898

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99		1			1
$6 to $6.99					
$7 to $7.99	1	1			2
$8 to $8.99					
$9 to $9.99					
$10 to $10.99	1	1			2
$11 to $11.99	2				2
$12 to $12.99	2				2
$13 to $13.99					
$14 to $14.99	2				2
$15 to $17.99	8				8
$18 to $20.99	1				1
$21 to $24.99					
$25 and over	3				3
Totals	20	3			23

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	18	2	20
February	19	2	21
March	19	3	22
April	19	4	23
May	20	3	23
June	20	6	26
July	22	6	28
August	24	6	30
September	23	7	30
October	25	5	30
November	22	5	27
December	20	3	23

TABLE No. 88. WINDOW SHADES.

(6 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	7	
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	2	2
Under 18 years of age		
Totals	9	2
Wage earners:		
18 years of age and over	36	3
Under 18 years of age	1	
Totals	37	3

Salary and wage payments—annual:	
Officers, superintendents and managers	$5,530
Clerks, stenographers, salesmen, etc.	2,241
Wage earners (including piece workers)	14,050
Total	$21,821

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99					
$7 to $7.99		1			1
$8 to $8.99					
$9 to $9.99		2	1		3
$10 to $10.99	1				1
$11 to $11.99	1				1
$12 to $12.99	1				1
$13 to $13.99	4				4
$14 to $14.99	2				2
$15 to $17.99	10				10
$18 to $20.99	14				14
$21 to $24.99	3				3
$25 and over					
Totals	36	3	1		40

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	36	1	37
February	39	1	40
March	36	2	38
April	37	1	38
May	38	1	39
June	37	3	40
July	40	3	43
August	39	3	42
September	39	3	42
October	42	3	45
November	38	2	40
December	40	2	42

TABLE No. 89. WIRE WORK (including wire rope, netting, etc.)

(5 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	5	1
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	7	
Under 18 years of age		
Totals	12	1
Wage earners:		
18 years of age and over	32	
Under 18 years of age		
Totals	32	

Salary and wage payments—annual:	
Officers, superintendents and managers	$16,844
Clerks, stenographers, salesmen, etc	5,815
Wage earners (including piece workers)	24,071
Total	$46,730

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4					
$4 to $4.99					
$5 to $5.99					
$6 to $6.99	1				1
$7 to $7.99					
$8 to $8.99					
$9 to $9.99	1				1
$10 to $10.99	2				2
$11 to $11.99	1				1
$12 to $12.99	1				1
$13 to $13.99	7				7
$14 to $14.99	2				2
$15 to $17.99	7				7
$18 to $20.99	10				10
$21 to $24.99					
$25 and over					
Totals	32				32

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	37		37
February	32		32
March	31		31
April	32		32
May	32		32
June	35		35
July	33		33
August	30		30
September	31		31
October	28		28
November	31		31
December	32		32

TABLE No. 90. ALL OTHER INDUSTRIES.*

(46 establishments reporting.)

Los Angeles.

	Male	Female
Number of employees.		
Salaried:		
Officers, superintendents and managers	90	2
Clerks, stenographers, salesmen, etc.:		
18 years of age and over	91	54
Under 18 years of age	3	
Totals	184	56
Wage earners:		
18 years of age and over	814	121
Under 18 years of age	14	7
Totals	828	128

Salary and wage payments—annual:	
Officers, superintendents and managers	$191,603
Clerks, stenographers, salesmen, etc.	145,724
Wage earners (including piece workers)	703,226
Total	$1,040,553

Weekly Wage Rates of Wage Earners.

Weekly wage rate	18 years of age and over		Under 18 years of age		Total
	Males	Females	Males	Females	
Under $4	3		2	3	8
$4 to $4.99		8			8
$5 to $5.99	3	6	3	3	15
$6 to $6.99	7	12	4	1	24
$7 to $7.99	10	16	2		28
$8 to $8.99	10	16	1		27
$9 to $9.99	19	21			40
$10 to $10.99	39	11	2		52
$11 to $11.99	34	12			46
$12 to $12.99	88	9			97
$13 to $13.99	67	5			72
$14 to $14.99	45	1			46
$15 to $17.99	184	3			187
$18 to $20.99	137	1			138
$21 to $24.99	105				105
$25 and over	63				63
Totals	814	121	14	7	956

Number of Wage Earners, by Months.

Month	Males	Females	Total
January	740	75	815
February	765	100	865
March	762	125	887
April	810	131	941
May	828	121	949
June	796	128	924
July	782	114	896
August	861	134	995
September	857	143	1,000
October	835	137	972
November	852	124	976
December	855	116	971

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*See note on following page.

INDUSTRIES AND NUMBER OF ESTABLISHMENTS INCLUDED IN TABLE No. 90, "ALL OTHER INDUSTRIES."

Los Angeles.

Agricultural implements	1
Babbitt metal and solder	1
Beehives and supplies	3
Belting, canvas	1
Butter, cheese and condensed milk	2
Cans, tin	1
Cement products	2
Cooperage and wooden goods (n. e. s.)	2
Display fixtures	1
Electroplating	2
Fireworks	1
Gloves, leather	1
Glue and tallow	2
Iron and steel forgings, bolts and nuts	1
Knit goods	2
Leather dressings, oils, etc.	1
Laboratory supplies	1
Liquors, vinous	1
Millinery	2
Musical instruments	1
Paper and paper goods (n. e. s.)	2
Patent medicines, compounds and druggists' preparations	1
Patterns, wood	2
Pennants and novelties	1
Petroleum refining	2
Rag carpets and weaving	1
Registers and computing machines	1
Soap, washing powders, etc.	2
Surgical appliances and hospital supplies	3
Theatrical scenery	1
Vending machines	1

SECOND BIENNIAL REPORT

OF THE

California State Civil Service Commission

TO THE GOVERNOR

DECEMBER 20, 1916

CALIFORNIA
STATE PRINTING OFFICE
1916

27621

COMMISSIONERS:

EDGAR WILLIAMS, President.
J. M. HUNTER
CHARLES WESLEY REED

JULIAN C. WHITMAN,
Secretary and Chief Examiner.

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SECOND BIENNIAL REPORT OF THE STATE CIVIL SERVICE COMMISSION TO THE GOVERNOR.

To the Honorable HIRAM W. JOHNSON,
Governor of California,
Sacramento, California.

DEAR SIR: Pursuant to the provision of the civil service law (Section 5, subdivision 8), the Civil Service Commission has the honor to submit its second biennial report and suggestions.

We take pleasure in reporting that marked progress has been made since our last report to you of December, 1914. Since the holding of our first examination and the completion of the first eligible register in December, 1913, 2,155 persons have been certified and appointed. Many of these appointments were for seasonal or short time employment, but of this number 1,265 are now in the service.

To ascertain the efficiency in service of employees appointed from lists created after examination, the commission recently submitted to heads of departments a form for reporting in detail as to the satisfactoriness of the services rendered by such employees. The form provided for comments as to ability, interest in work, loyalty, capacity for advancement and other points essential to the successful performance of the duties of their positions.

The returns from these reports have been most gratifying, and effectively demonstrate through the testimony of the heads of departments that competitive selection by suitable tests is not only practicable but may be highly successful in an organization such as is maintained in the executive branch of our state government. Of the 725 persons for whom reports were returned, 49 per cent have been reported as performing excellent or exceptional work; 43 per cent as performing thoroughly satisfactory work; 6 per cent as performing fair or not wholly satisfactory work; and 2 per cent poor or unsatisfactory work. The commission is investigating reports of poor work with a view to improving it, or eliminating the unsatisfactory employees from the service. We think this is a very interesting and striking record.

Before proceeding to a detailed description of our work, it may be advisable to set forth with clearness the commission's conception of its work as an administrative function of government.

Civil service originally came into existence as a restrictive measure and as a curb on the abuse of political power. It made merit the basis of appointment and worked for economy by preventing expensive periodical upheavals and turnovers, but its prime object was to put to an end the despoiling of the public service for the benefit of the political party in power. Our conception of civil service is that it is a constructive function of government; a direct and effective agency for efficient and economic management.

Centralization of Employment Control.

We believe that in our administration of civil service, we should be principally concerned with recruiting efficient employees for the state government by encouraging men and women of ability, possessing an enthusiasm for public service, to enter the state's employ; by offering them a broad field of work, and in certain lines a life career worthy of the ambition of any man or woman; and finally by making the service attractive to such persons by considering their welfare and happiness after they are in the service. Continued good work and enduring enthusiasm are promoted by comfortable working conditions and contentment, and these conditions are in turn the product of studied thought and effort in that direction. In a public service such as ours, which has grown so rapidly, and is administered by about seventy different department heads, working conditions are not the same in all departments. Employees are not given equal consideration; like compensation is not paid for like duties; hours for the same employment differ widely; and opportunities for advancement are not equal. To correct these inequalities and injustices it is necessary that they be made the concern of one central body with authority to direct changes in the various departments where the need for such changes exists.

The problems of the employee in the service are so related to the problems of selecting suitable employees for the service that they are, for most effective work, inseparable. We believe that for the highest fulfillment of our function in government, all these things must receive our consideration.

A constructive administration of civil service should concern itself earnestly to achieve the following results: to recruit the service with able men and women; improve the standard of service by educational supervision of those in the service; maintain the interest of employees in their work by providing for advancement on merit beyond the limits of any one department; and create a better spirit among employees by the payment of like compensation for like duties, and by instituting helpful welfare work wherever possible. A sincere effort to secure these results will give the public ever increasing confidence that the functions of government are being administered with a degree of efficiency consistent with a personnel selected on merit and actuated by a spirit free from obligation other than that to the service itself.

We do not believe that the state of California will ever return to the doctrine that "to the victors belong the spoils," subject heads of departments to constant importunities and pressure for place or revive the social and economic distress caused by political changes.

The wisdom of centralizing employment control is now firmly established in private business. Heretofore, the right to employ and discharge was deemed the inalienable right of the straw boss, foreman, superintendent, or any other supervising officer, but this situation has changed, and we find in large corporations that the selection and control of employees is centralized in an employment department which devotes its entire time to this work. The employment department is concerned with recruiting and selecting employees, giving them educational advantages, and training them for advancement and promotion; supervising transfers and discharges; and carrying on work relating to the social, physical and financial welfare of employees. In fact, its function is dealing with the human element of business, with the personnel of the organization, and is one of ever increasing importance in progressive organizations.

The point to which we desire to draw your particular attention is that large private employers have centralized employment control and select their employees through a central department and do so by tests of fitness; and that such a department in a governmental organization such as ours can be an active and effective aid to good management.

Number and Kinds of Positions in the Service.

At the present time, there are about 5,645 positions falling within the jurisdiction of civil service. These positions are scattered among seventy-two separate jurisdictions and departments.

Of this number about 700 are laborers who qualify for the service by a noncompetitive test, with eligibility for the service in the order of the receipt of their applications. The other 4,945 positions are filled as a result of competitive tests, and the order of eligibility is based on the merit, efficiency, and fitness shown in these tests. Within the 4,945 positions, there are 276 different kinds of employment, each with its individual requirements and separate tests of fitness. The 276 different kinds of employment are divided into 145 skilled and semiskilled trades positions, and 131 positions with educational requirements, such as clerical, scientific, professional, semiprofessional, technical, and special governmental positions. A list of the different employments will be found in the classification of the service in part III of this report.

Examinations.

It is manifest that in a service so diversified and with so many technical and professional positions, the Civil Service Commission could not maintain within its own organization a staff competent to deal with each one of them. It has been necessary, therefore, for the commission to call upon experts of all kinds, both from public and private life, to assist in setting suitable entrance requirements and in determining the fitness of candidates. In this call for expert help, we have found a ready and generous support which has contributed materially to the success of our examinations. The heads of departments in whose organizations the positions to be filled existed have also uniformly given their hearty cooperation and support.

For the skilled and semiskilled trades, the custodial and agricultural service, and other special services of the same order, competitive tests have been conducted in the following manner: Candidates are required to submit a detailed statement of all past employments bearing on the position sought. The names and addresses of past employers are required and from these, reports of past performance are secured. With this information on hand, the candidates are called before a special board of examiners for interview. The boards are composed of groups of persons particularly well qualified to pass upon the value of the past experience, and the capability and general fitness of candidates for the positions they seek. A representative of the commission always sits as a member of these boards. The rating given by these boards determines the order of eligibility.

Where feasible and advisable, practical tests are given. In an examination for auto truck driver, for example, candidates were required to give a practical demonstration of ability to drive and operate a heavy truck under load, and to display resourcefulness in meeting emergency situations and in making repairs. An examination was given for hydrotherapy operators for the state insane hospitals in which candidates were called upon, under the observation of special examiners, to actually give treatments to patients to demonstrate in a practical way their proficiency in the use of hydrotherapy equipment. In this instance, the practical test supplemented a written test on the subject of hydrotherapeutic nursing. In selecting linotype operators for the printing plant, candidates were given a varied and extended test in machine operation, and were rated on the excellence of their work, supplemented by an oral interview by a special board of examiners dealing principally with past experience.

For such positions as clerk and stenographer, of which there are a greater number than any other class, tests are given dealing with the actual duties to be performed, supplemented by suitable educational tests and tests to reveal native ability. In positions such as these, perhaps more than in any others, capacity to grow is an essential element of fitness. The accuracy with which the tests prepared reveal the relative fitness of candidates has been quite striking. In the investigation of the performance of employees certified to the service after examination, there was a striking correlation between poor performance and low grade in the tests, and excellent performance and high grades in the tests.

In the case of professional and technical examinations the written test is sometimes omitted, and the fitness of candidates is determined by a board of examiners composed of specialists and recognized authorities in the profession or science under consideration. In some instances, however, candidates are first required to acquit themselves in a satisfactory manner in a written test before they are called before the oral examining board for interview. When the board makes its ratings, the experience of each candidate, together with confidential reports from past employers, is before it and is given an important weight in determining the relative fitness of applicants.

The following important examinations were conducted in the above manner:

Auditor, State Corporation Department		$3,600	per annum
Assistant State Engineer		3,000	per annum
Assistant Engineer, Board of State Harbor Commissioners		2,700	per annum
Civil Engineer, Grade IV	$2,400 to	3,000	per annum
Director, Bureau of Tuberculosis, State Board of Health		3,000	per annum
Superintendent of Construction, Department of Engineering		2,400	per annum
Assistant Secretary, State Board of Health		2,400	per annum
Fabric Buyer, State Purchasing Department		2,400	per annum
Assistant Physician, State Hospitals	$1,800 to	2,400	per annum (and maintenance)
Auditor, State Board of Control	1,800 to	2,400	per annum

Classification and Standardization.

The commission plans a more comprehensive classification of the service than has been heretofore possible. This classification will, when complete, give for the 276 different kinds of positions the following information:

1. Description of duties and illustrative examples.
2. Requirements—
    - (*a*) Education.
    - (*b*) Experience.
    - (*c*) Special knowledge.
    - (*d*) Personal characteristics.
3. Compensation.

The work done so far is merely preliminary, for, in order to complete it, greater funds than are now at our disposal will be necessary. The information that will be gathered in the making of this classification is of the greatest need in our examination and administrative work, and we urge that our appropriation be increased to meet this need.

The gathering of data for the new classification will inevitably bring constantly before us the inequality of the compensation paid for work of like character and calling for the same qualifications of employees.

That marked inequalities exist no one will deny. Our records are full of them. But a constructive remedy equitable to all is not to be made without extensive investigation and study.

The problem of standardizing salaries is a very live subject in many governmental services. The most extensive work, perhaps, has been done in New York City, where a careful study of salaries has been made. It is interesting and instructive to note the statement of Geo. L. Tirrell, Director of the Bureau of Standards, in his report on the classification and standardization of the service:

"The proposed standard specifications and salary rates have been in practical operation in the city of New York since February 1, 1915. The immediate result of the policy adopted by the Board of Estimate and Apportionment at that time, in regard to filling positions becoming vacant, was to place a complete embargo upon the inflation of existing salaries and the fixation of salaries at unfairly high rates. Previously, the cost of employment by the city had been increasing at the rate of from two to two and one-half million dollars a year. From the time when standards were applied, there was not only a complete check on this growth in annual cost, but an actual and substantial diminution in cost, which has continued up to the present time. During the remainder of the year 1915 the current application of standard rates and standard methods to the filling of vacancies resulted in a curtailment of the personal service schedules within the control of the Board of Estimate and Apportionment of more than $300,000. This saving is estimated without reference to the action taken by the Board of Estimate and Apportionment in preparing the budget for the year 1916, and did not involve any hardship to employees already in the service."

It is also interesting to note that

"Tax Budget Committee in preparing the budget for the year 1916 decided it would make use of the standard specifications and salary rates in measuring all existing employment. Appraisals were made and submitted by the Bureau of Standards showing the minimum and maximum values of the work being done in all positions. Upon these appraisals, the Board of Estimate and Appraisement based its official action regarding salaries."

In determining just and equitable salaries, it is absolutely necessary to make an intensive study of positions, duties to be performed, and the qualifications employees should possess. This information is exactly that which should be gathered by the Civil Service Commission in its classification for the purpose of determining examination groups. Examination requirements and salary payments are inseparable. The Civil Service Commission is therefore in the best position to go extensively into the question of salary standardization.

The extensive information necessary for a more complete classification of the service will be of inestimable value in examination work, and would form a satisfactory basis from which to study the standardization of salaries. The gathering of this information will require the addition of one assistant to our force and we urgently request that our present appropriation be increased to allow for it.

The state pays more than four million dollars to employees coming under civil service jurisdiction. Some salaries are too low, and some too high, and we believe that an equitable adjustment of salaries would result in a substantial improvement. The continual demand for increases in salaries is tremendous and yet there has been no investigation and appraisal of the value of the services rendered in the various positions of the service. Only in a few minor institutional positions have maximum salaries and rates of increase been established. There is urgent need for equalizing salaries on the basis of service rendered not only from an economy standpoint but also from the standpoint of justice to and contentment of employees. Many minor positions receive a higher rate of pay than positions requiring higher qualifications and greater responsibilities. There is a feeling of unrest among the employees on account of the inequalities of compensation paid. The beneficial results of salary standardization are many and far reaching. We believe that to accomplish this for the state service would greatly advance administrative efficiency.

State Should Be Model Employer.

Many private corporations are spending hundreds of thousands of dollars a year in building up the personnel of their organizations; educational instruction is given; advancement is provided for where merit is shown; the work of employees is closely supervised and misfits are given employment at work for which they are qualified; their health and safety are looked after; and their financial and social welfare is made the concern of the employer. These are not philanthropic under takings, but are considered as real and tangible benefits. In this day of progress toward a more efficient administration of democratic government, the state can not afford to be indifferent to these things.

As a first step in the right direction, we are about to undertake a survey of the state service in cooperation with our state university for the purpose of finding out how our higher educational institutions can best serve the state in the matter of recruiting the service with well trained and highly qualified men and women, and in providing educational advantages for those now employed with a view to raising the standard of service.

During the coming year, we will give greater consideration to promotional examinations than has been heretofore possible. It has been interesting to observe the beneficial effect of the few promotional examinations given. Heads of departments have commented on the increased interest in the work of employees and their very marked tendency for self improvement. The benefit to the state from this source is marked.

Temporary and Emergency Appointments.

Many of the state employments are unattractive, both on account of salary or wages and working conditions. Institutional help has always been a problem, and the recruiting of this branch of the service difficult. Many other employments are in out of the way places and for short periods only. During the two-year period from September 15, 1914, to September 15, 1916, 6,063 temporary appointments and 3,253 emergency appointments were made. On September 15, 1916, 1,470 of the temporary appointees were still in the service. While a majority of these appointments are to such positions as mentioned above, nevertheless the number is larger than it should be, and we hope to have an increase in our appropriation that will make it possible to clear from our records all authorizations for temporary appointment.

Dismissals.

During the two-year period from September 15, 1914, to September 15, 1916, 133 dismissals were made, 79 during the probationary period, 49 with permanent standing, and 5 on account of noncitizenship. Thirty-one of the 49 permanent employees dismissed had civil service standing because they were in the service of the state at the time the civil service law went into effect, and 18 were those appointed after certification from eligible lists. Of the total number dismissed, 54 were institutional employees, and 28 in laboring and trades positions in the Department of Engineering.

Suggestions.

The civil service law provides that the commission may make "any suggestions that the commission or any commissioner may deem practicable for the more effectual accomplishment of this act," and the following are offered:

First—A constitutional amendment safeguarding the essential principles of the merit system and protecting civil service from attacks should be provided for.

Second—The appointing power should be allowed to specify sex when requesting certification to a position. There are some positions which a woman can not fill, not because of lack of ability, but because of peculiar requirements or environment.

Third—The Railroad Commission should be included within the provisions of the civil service law. Its employees are entitled to the same protection accorded those of all other departments. This is a most important department of the government of the state and should not be subject to the disorganization which would be inevitable under changed political conditions.

Fourth—We believe that provision could well be made in our law for administering civil service for counties or municipalities when such political subdivisions should seek such aid. Such a provision would make available to the smaller units the organization and experience of a large and well established civil service commission, which should make for marked economy and efficiency of administration. We have just received word from a member of the Committee on Civil Service of the Board of County Freeholders of Santa Barbara charged with the framing of a new charter that he believes that the State Civil Service Commission could administer this work more effectively and efficiently than a local body.

The Civil Service Commission feels that it has accomplished substantial results in the last two years, and looks forward to a period of greater activity and extended accomplishment during the next biennial period.

Respectfully submitted.

EDGAR WILLIAMS, President,
J. M. HUNTER, Commissioner.

MINORITY REPORT.

SACRAMENTO, November 22, 1916.

Honorable HIRAM W. JOHNSON,
Governor of the State of California,
Sacramento, California.

MY DEAR GOVERNOR: In accordance with section 5, subdivision 6, of the civil service act, in which it is provided that the civil service commission "shall make a biennial report to the Governor for transmission to the legislature," with "any suggestions the commission or any commissioner may deem practical for the more effectual accomplishment of the purposes of this act," I have the honor to make the following suggestions:

The essential principles of the civil service act should be crystallized in a constitutional amendment. As surely as time passes, an administration anxious to reward its partisans at the expense of efficient government will some day come into power. The civil service act alone will stand in the way, and its amendment in the interests of the spoilsmen will be as easy in California as it has been in Colorado, or in Connecticut, or in the national government.

The tendency of legislation in California since the passage of the civil service act has been away from the civil service law. Senate Bill 1166, passed by both houses of the legislature but vetoed by yourself, exempted the Board of Control from civil service, and would have made the Civil Service Commission impotent for good, because it left it no power to enforce its decisions.

The Reclamation Act, chapter 686, section 6, of the Statutes of 1915, provides that

> "The secretary, assistant secretary, general manager, chief engineer, and two assistant engineers, all consulting engineers, the attorney for the board, and all special attorneys employed by the board, and such employees as may be otherwise exempted by law, *shall be exempt from the provisions of the civil service laws of this state.*"

I asked the gentleman who prepared that law why he had exempted certain classes that were already exempted by the civil service law. He replied, "I didn't want to take any chances."

The act creating a Department of Petroleum and Gas, chapter 718, section 4, of the Statutes of 1915, provides that

> "The supervisor, the deputies, and the attorney *shall not be subject to the civil service act.*"

Shortly before the session of the legislature of 1915, the Attorney General's office informed the Civil Service Commission that it would require the certification of two stenographers who were capable of handling legal business. Shortly after that the request was withdrawn. I find that section 475 of the Political Code was amended, chapter 616, section 1, of the Statutes of 1915, and provides for additional employees for the Attorney General, and

> ''The service agent and two of said stenographers, to be designated by the attorney general, *shall be exempted from the provisions of the civil service act* and shall hold their positions during the pleasure of the attorney general.''

The tendency of legislation thus exemplified will doubtless continue, and with increasing emphasis. The only way to prevent it, and to make the civil service law impregnable, is by a constitutional amendment.

The fact that several of the most important departments of the state government are exempt from civil service militates against the usefulness of the civil service act. The prisons, the Railroad Commission, the Sealer of Weights and Measures, the Controller's office, are altogether, or in a large measure, free from the civil service law. It is made a penal offense for the Board of Control to make appointments except as provided in the civil service act, but it is perfectly legal for the Railroad Commission to make appointments by favor. A lessening respect for the civil service law must be the result of an appreciation of such inconsistencies. Either civil service is good, or it is bad. It should apply to all employees in the state equally (with the exception of employees having confidential relations to the appointing power) or it should apply to none.

This system of divided allegiance was tried in San Francisco for years. From 1900 to 1913 the city employees were under civil service but the county employees were not. The Tax Collector had to follow the civil service law, but the Sheriff, right across the corridor of the City Hall, legally made appointments by political favor. It was impossible to have the administration of the civil service law either efficient or respected under such conditions. Abuses which sprang up smelled to heaven. They were not corrected until a constitutional amendment was submitted by the legislature and approved by the people, which provided that the county officials should be subject to the provisions of the City and County Charter.

In the state government, the employees of the prison directors (except clerks) are appointed by the warden, as a result of the authority granted in article 10, section 3 of the constitution, notwithstanding, however, that the civil service act attempted to bring that department of the government under the merit system. The county employees of the Sealer of Weights and Measures are exempt from the state civil service law because they are appointed by boards of supervisors, and are exempted from the city and county civil service law because they are appointed by authority of the state. It is noteworthy that the New York Bureau of Municipal Research, which has recently concluded a survey of San Francisco, recommends that the employees of the Sealer of Weights and Measures be put under civil service in order to secure greater efficiency. The people of that municipality adopted the suggestion at the recent election.

The 115 appraisers appointed by the Controller are free from civil service, because the law authorizing their appointment, though signed by you on the same day, June 16, 1913, on which you signed the civil service law, yet was printed by accident a few pages later than the civil service law in the Statutes of 1913. The civil service law appears in the statutes for that year on page 1035, while the inheritance tax law appears on page 1066. It has been held by the Attorney General that this indicates that the legislature intended that the latter law repeals the former as far as it is inconsistent therewith; and, inasmuch as the Controller may remove inheritance tax appraisers at his pleasure, it must follow that the civil service act does not apply.

I respectfully urge that you consider the inevitable disintegration of respect for the civil service law consequent upon the divided allegiance of important departments of the state government. The Board of Control, for instance, might well feel that they were as much entitled to be free from the restrictions of the civil service law as the State Board of Railroad Commissioners. I am quite sure that every argument that can be used for the exemption of the Railroad Commission applies with equal merit to the State Board of Control, or the Highway Commission, or the Department of Engineering. I am equally certain that whatever arguments are in favor of the merit system as applied to any important department of the state government apply with equal force to the Railroad Commission. We may look to the future with confidence that many laws will be passed by the legislature which will macerate the civil service law. The only way to provide for a respected and respectable civil service administration is to submit to the people a constitutional amendment which will prevent for all time onslaughts on the civil service law, and will provide for a uniform administration of that law, applicable to all departments of the state government alike.

The civil service law should provide that the commissioners shall give all of their time to their duties. I know, as one of the authors of the civil service law, that it was not at first intended that the commissioners should give all of their time to their duties, but the work of the commission has been growing. Frequent meetings are necessary. In fact, decisions on important points are liable to be called for at any moment, and a quorum should be present at all times at the seat of government. More examinations could be held. The development of the efficiency work required by the civil service law could be commenced. Promotional records could be supervised—in fact, the whole work of the commission improved.

We need a man worth $250 a month to begin the work of standardizing salaries. In New York City, the Bureau of Standards effected a saving of two million dollars a year. In California no two departments have the same wages for the same class of employees. A stenographer in one department will get $100, in another $60 for the same class of work. The $750 a month paid to the commissioners holds too great a ratio to the $2,500 a month total available appropriation for the work of the Civil Service Commission, to allow for the hiring of a suitable efficiency engineer. I am not making this statement in criticism of any commissioner; it applies as much to myself as to any other commissioner. I am striving to make these suggestions in a perfectly disinterested manner. I feel that the great work committed to the civil service commissioners is liable to meet with serious mishap unless this question is met squarely and decided promptly. The commissioners should be required to give all their time to their duties, and be paid adequately; or they should be paid a per diem for the time they actually work, leaving the administration of the law in the hands of an executive deputy; or the law should be amended so that a single commissioner, like the Bank Commissioner or the Corporation Commissioner, should have charge of the administration of the law. The civil service reformers in the east are all coming to believe in a plan involving well paid commissioners, always on the job, either three in number or a single commissioner.

The work of the present California State Civil Service Commission has been well done, but a great deal of friction and criticism have resulted from the partial attendance of the commissioners, and it seems to us that the friction and criticism are bound to increase in the future. For the well-being of civil service reform, the question of the commissioners being always in attendance ought to be settled. I think that this is the most important question concerning the administration of the civil service law that can be brought to your attention.

The election just concluded illustrates dramatically the wisdom of appointing election officers on account of capacity. The officers of election throughout California are made the subject of petty political appointment. The election returns are always delayed, sometimes unconscionably. The result is always to cast suspicion on a close election. Innumerable recounts have proven the commission of grave errors, through the ignorance and incapacity of the election officers themselves. The Registrar of Voters in San Francisco has assured me in the past that if election officials were selected according to merit, the returns could be quickly made, the numerous errors that now occur would be avoided, and the cost of elections greatly reduced.

Respectfully submitted.

CHARLES WESLEY REED,
Commissioner.

POSITIONS EXEMPTED FROM PROVISIONS OF THE CIVIL SERVICE ACT BY RESOLUTION OF THE COMMISSION.

Department.	*Position.*	*Reasons for Exemption.*	*Names of Incumbents.*
BANKING DEPARTMENT.	Confidential credit assistant.	"The Superintendent of Banks now has no exempted confidential employee, and he asks for this for the purpose of using him in purely confidential relations in the examination of new banking corporations."	H. J. Irwin. (Has recently acquired Civil Service standing as bank examiner by competitive examination.)
	One assistant whose duty it is to look after the bond investments by various banks.	"The position is of a particularly confidential nature."	D. S. Canny.
CORPORATION. DEPARTMENT.	All employees with the exception of clerks and stenographers and other employees in positions for which eligible lists are available, for a period of one year from January 5, 1915.	"The Commissioner has just been appointed, all corporation business subject to his jurisdiction must be passed upon before business can be done, and immediate appointment of experts is necessary. Furthermore, the business itself has not been standardized and, until a certain time has elapsed, it would be impossible to anticipate with certainty the duties to be performed by the officers appointed."	*H. W. Bowman, Deputy. H. J. Brown, Deputy. *Allyn Burr, Copyist. *Daisy Cassell, Clerk-Stenographer. *John B. Fewkes, Auditor. *Lois Healey, Filing Clerk. *W. J. McKean, Auditor. Fred M. Miller, Engineer. *Clifford O'Brien, Messenger. S. A. Ratliff, Secretary. Elizabeth Stokes, Bookkeeper.
CORRECTIONAL INSTITUTIONS.	Inmate help.	"In the administration of the various correctional institutions it is frequently advisable to employ inmate help at small salaries, and the Civil Service Commission believes such employment would not only be of benefit to the institution but of particular benefit to the inmates."	Various inmates of the following institutions: California School for Girls. Preston School of Industry. Whittier State School.

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*No longer employed.

POSITIONS EXEMPTED FROM PROVISIONS OF THE CIVIL SERVICE ACT BY RESOLUTION OF THE COMMISSION —Continued.

Department.	*Position.*	*Reasons for Exemption.*	*Names of Incumbents.*
CALIFORNIA SCHOOL FOR THE DEAF AND BLIND.	Student readers to the blind.	"College students are employed as readers to the blind students at a compensation of 25 cents an hour; such employment aids college students in earning a living; the list of readers changes constantly; and they work only part of a day at a time."	Alma U. Ames. Rosabelle Ames. Willard Davis. E. J. Ellsworth. Mr. Farrington. Mr. Linstrand. Mr. Lockwood. Mr. McCormick. Lester G. Osborn. Mr. Winter. Ross Wright.
BOARD OF HEALTH.	Student help employed in the various bureaus of the Board of Health at the University of California.	"Such students work at the rate of 25 cents an hour for short periods, and it causes employment to be given to a great number of students who are working their way through college. Such positions are not subject to open competitive examination on the part of the general public, and are not such as could be provided for from an eligible list after examination."	John Adams. Harry C. Coe. Joseph Doman. Olin H. McCord. John G. McQuarrie. E. R. Morehead. Phillip E. Rudolph. A. Sander. H. J. Sears. Stanley V. Wilson.
STATE HOSPITALS.	Inmate help.	"In the administration of the various hospitals it is frequently advisable to employ inmate help at small salaries and such employment is not only of benefit to the institution but of particular benefit to the inmates."	Inmates of the following hospitals: Agnews State Hospital. Mendocino State Hospital. Napa State Hospital. Norwalk State Hospital. Sonoma State Home. Southern California State Hospital. Stockton State Hospital.
INDUSTRIAL ACCIDENT COMMISSION.	Medical director and one assistant.	"Said director is not required to give all of his time to the service of the commission and the duties of these officials require expert professional and technical skill."	Dr. M. R. Gibbons, Director. Dr. M. E. Rummell, Assistant.

INDUSTRAL ACCIDENT COM.—Continued.	Medical referees and all referees to hold hearings.	"Their work is special and occasional."	H. J. Bischoff. George H. Johnson. H. C. Nelson. W. P. Ratliff.
BUREAU OF LABOR STATISTICS.	The following employees of the State Employment Bureaus for a period of one year from January 4, 1916: Manager Men's Department, San Francisco. Manager Women's Department, San Francisco. One Publicity Man, San Francisco. One Solicitor, San Francisco. One Manager, Oakland. One Manager, Sacramento. Two Solicitors, Los Angeles.	"This is a new undertaking in the State of California, and Mr. McLaughlin feels that it is essential to the success of this work to postpone the holding of examinations for these positions until the work is established and the needs of the department are known."	W. M. Collins, Manager Men's Department, San Francisco. Natalie Longtin, Manager Women's Department, San Francisco. A. E. Falch, Publicity Agent, San Francisco. W. A. Granfield, Solicitor, San Francisco. Mrs. Helen Power, Manager, Oakland. E. F. Stahl, Manager, Sacramento. Edw. J. Sullivan, Solicitor, Los Angeles. J. J. Doherty, Solicitor, Los Angeles.
MOTOR VEHICLE DEPARTMENT.	Superintendent of the Los Angeles Division of the Motor Vehicle Department.	"The Superintendent of the Los Angeles Division is in a city distant from the head of the department and his duties are of a confidential character."	L. W. Butler.
WATER COMMISSION.	All employees with the exception of clerks and stenographers and other employees in positions for which eligible lists are available, for a period of one year from January 5, 1915.	"The Commission has just been created, all business subject to its jurisdiction must be passed upon before business can be done, and immediate appointment of experts is necessary. Furthermore, the activity of this office has not been standardized and, until a certain time has elapsed, it would be impossible to anticipate with certainty the duties to be performed by the officers appointed."	George H. Baldwin, Engineer. George E. McLeod, Special Agent. Harold T. Power, Engineer.

FINANCIAL STATEMENT.

Sixty-fifth and Sixty-sixth Fiscal Years.

	Sixty-fifth fiscal year	Sixty-sixth fiscal year
Appropriation	$25,000 00	$30,000 00
Balance brought forward from sixty-fourth fiscal year	215 24	----------
Emergency fund	119 03	----------
Totals	$25,334 27	$30,000 00
Expenditures	25,334 27	29,649 66
Balance	----------	$350 34

Distribution of Expenditures.

Office salaries	$6,309 12	$7,322 74
Office administration	3,900 00	4,320 00
General administration	109 85	484 71
General traveling (commissioners)	974 46	871 77
San Francisco office	1,477 99	1,358 40
Sacramento office expense	309 10	265 68
Postage	848 00	1,172 44
Printing	850 37	1,138 08
Furniture	443 50	798 16
Examinations	1,111 88	2,312 18
Los Angeles office expense	----------	605 50
Salaries of commissioners	9,000 00	9,000 00
Totals	$25,334 27	$29,649 66

TABLE No. 1.

Table Showing Status and Total Number of Employees in the Service November 28, 1916.

Department	*Exempt	#Original employees	Taken from eligible lists	Appointed under temporary authorization	Laborers			Total
					#Original employees	Taken from eligible lists	Appointed under temporary authorization	
	1	2	3	4	5	6	7	8
1. Advisory Pardon Board	4	------	------	------	------	------	------	4
2. Agricultural Association, Sixth Dist.	3	1	1	14	------	------	------	19
3. Agricultural Society	13	6	------	4	------	1	13	37
4. Attorney General	13	5	2	1	------	------	------	21
5. Banking Department	4	17	13	------	------	------	------	34
6. Building and Loan Commissioner	2	1	------	------	------	------	------	3
7. Capitol Building and Grounds, Superintendent of	2	35	14	------	------	------	------	51
8. Charities and Corrections, Board of	7	1	2	8	------	------	------	18
9. Civil Service Commission	4	------	13	1	------	------	------	18
10. Colonization and Rural Credits, Commission to Investigate	6	------	------	6	------	------	------	12
11. Commission Market, State	2	2	2	1	------	------	------	7
12. Control, Board of	10	10	40	2	------	------	------	62
13. Controller	12	14	14	7	------	------	------	47
14. Corporations, Commissioner of	2	1	8	5	------	------	------	16
15. Court of Appeals, First District	------	4	1	------	------	------	------	5
16. Court of Appeals, Second District	------	5	------	------	------	------	------	5
17. Court of Appeals, Third District	------	3	1	1	------	------	------	5
18. Dairy Bureau	4	10	6	------	------	------	------	20
19. Deaf and Blind, School for	6	53	5	35	------	------	------	99
20. Dental Examiners, Board of	8	------	------	8	------	------	------	16
21. Dental Surgeon, State	1	------	------	------	------	------	------	1
22. Education, State Board of (See Superintendent of Public Instruction)	8	------	------	------	------	------	------	8
23. Embalmers, Board of	5	------	------	------	------	------	------	5
24. Engineering, Department of	6	52	48	929	------	8	594	1,637
25. Equalization, Board of	5	3	------	------	------	------	------	8
26. Fish and Game Commission	3	87	19	26	------	------	------	135
27. Forestry, Board of	1	4	------	------	------	------	------	5
28. Girls, School for	8	1	3	29	------	------	------	41
29. Harbor Commissioners for Port of Eureka	5	------	------	------	------	------	------	5
30. Harbor Commissioners for Bay of San Diego	3	------	------	------	------	------	------	3
31. Harbor Commissioners for Port of San Jose	3	------	------	------	------	------	------	3
32. Harbor Commissioners, Board of State	5	345	100	8	32	23	------	513
33. Health, Board of	12	19	23	17	------	------	------	71
34. Highway Commission, California	6	126	103	181	------	------	------	416
35. Historical Survey Commission	5	------	------	------	------	------	------	5
36. Horticulture, Commissioner of	2	16	11	6	------	------	------	35
37. Hospitals, Superintendent of State	2	5	1	------	------	------	------	8
38. Agnews State Hospital	7	110	58	31	------	------	------	206
39. Mendocino State Hospital	7	50	60	33	------	------	------	150
40. Napa State Hospital	6	134	96	51	------	------	------	287
41. Norwalk State Hospital	7	1	27	7	------	------	------	42
42. Sonoma State Home	7	87	67	25	------	------	------	186
43. Southern California State Hospital	7	96	115	54	------	------	------	272
44. Stockton State Hospital	6	149	102	27	------	------	------	284
45. Immigration and Housing, Commission of	6	1	1	12	------	------	------	20
46. Industrial Accident Commission	14	9	91	53	------	------	------	167
47. Industrial Home for Adult Blind	6	9	6	16	1	------	1	39
48. Industrial Welfare Commission	7	------	------	5	------	------	------	12

TABLE No. 1—Concluded.

Table Showing Status and Total Number of Employees in the Service November 28, 1916.

Department	*Exempt	#Original employees	Taken from eligible lists	Appointed under temporary authorization	Laborers			Total
					#Original employees	Taken from eligible lists	Appointed under temporary authorization	
	1	2	3	4	5	6	7	8
49. Insurance Commissioner	2	5	7	1	------	------	------	15
50. Labor Statistics, Bureau of	10	20	10	10	------	------	------	50
51. Legislative Counsel Bureau	7	------	1	------	------	------	------	8
52. Library, California State	2	22	31	13	------	------	------	68
53. Lunacy, Commission in (See Superintendent State Hospitals)	------	------	------	------	------	------	------	------
54. Marshall's Monument, Guardian of	1	------	------	------	------	------	------	1
55. Medical Examiners, Board of	14	2	3	1	------	------	------	20
56. Mining Bureau	8	9	10	7	------	------	------	34
57. Motor Vehicle Department	3	2	28	12	------	------	------	45
58. Optometry, Board of Examiners in	3	------	------	------	------	------	------	3
59. Pharmacy, Board of	9	6	------	2	------	------	------	17
60. Polytechnic School, California	7	7	1	6	------	------	1	22
61. Preston School of Industry	5	36	7	49	------	------	------	97
62. Printing, Superintendent of State	2	113	16	15	------	------	1	147
63. Prison Directors, Board of	9	1	1	------	------	------	------	11
64. Public Instruction, Superintendent of	7	4	9	3	------	------	------	23
65. Purchasing Department	2	5	21	7	------	------	------	35
66. Reclamation Board	11	7	8	1	------	------	------	27
67. Redwood Park Commission	5	1	------	1	------	------	9	16
68. Secretary of State	2	22	------	1	------	------	------	25
69. Social Insurance Commission	7	------	------	18	------	------	------	25
70. Stallion Registration Board	3	------	------	------	------	------	------	3
71. Supreme Court of California	8	17	1	------	------	------	------	26
72. Surveyor General	2	8	1	------	------	------	------	11
73. Sutter Fort Trustees, Board of	4	3	1	------	------	------	------	8
74. Treasurer	2	11	------	------	------	------	------	13
75. Veterans' Home of California	9	27	36	58	------	------	------	130
76. Veterinarian, State	2	5	4	2	------	------	------	13
77. Veterinary Medicine, Board of Examiners in	5	------	------	------	------	------	------	5
78. Viticultural Commissioners, Board of	11	------	------	2	------	------	------	13
79. Water Commission	10	4	6	6	------	------	------	26
80. Weights and Measures, Superintendent of	2	------	2	1	------	------	------	5
81. Whittier State School	5	26	8	42	------	------	------	81
82. Woman's Relief Corps Home Assn.	11	------	------	------	------	------	------	11
	452	1,835	1,265	1,861	33	32	619	6,097 452
Under civil service jurisdiction	------	------	------	------	------	------	------	5,645

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*Elective officials, appointees of the Governor, and positions exempted by the civil service act.

#Includes persons now in service who were in the service at the time the civil service law went into effect, and entitled to continue without examination.

TABLE No. 2.

Tabular Statement of Examinations Held and Results Obtained During Period From September 15, 1914, to September 15, 1915.

Kind of examination	Date	Number of applicants	Number examined	Number passed	Per cent passed	Number failed	Per cent failed
1. Apple packing inspector	July 21, 1915	22	22	14	63.6	8	36.4
2. Architectural draftsman	Mar. 27, 1915	52	47	16	34.1	31	65.9
3. Attendant, Agnews	Dec. 3, 1914	21	21	17	80.9	4	19.1
Attendant, Southern California	Dec. 11, 1914	34	34	33	97.1	1	2.9
Attendant, Stockton	Sept. 10, 1915	85	85	53	62.4	32	37.6
4. Auditor	July 21, 1915	117	117	18	15.4	99	84.6
5. Auto truck driver	Aug. 14, 1915	163	163	41	25.2	122	74.8
6. Bacteriologist (assistant)	Feb. 13, 1915	3	3	1	33.3	2	66.7
7. Baker	July 17, 1915	12	12	7	58.3	5	41.7
8. Bindery help	Nov. 14, 1914	7	7	3	42.8	4	57.2
9. Blacksmith and helper	Oct. 17, 1914	58	58	33	56.9	25	43.1
10. Bookbinder	Nov. 14, 1914	16	16	13	81.25	3	18.75
11. Building estimator	May 8, 1915	12	10	4	40	6	60
12. Butcher	Jan. 9, 1915	12	12	7	58.3	5	41.7
13. Civil engineer, Grade II	Mar. 5–6, 1915	248	221	75	33.9	146	66.1
14. Clerk (chief)	Mar. 13, 1915	297	274	32	11.7	242	88.3
15. Clerk (general)	Aug. 28, 1915	452	452	69	15.2	383	84.8
16. Clerk-stenographer	Mar. 12–13, 1915	125	106	4	3.7	102	96.3
17. Compensation insurance clerk, stenographer and typist	May 15, 1915	110	97	36	37.1	61	62.9
18. Construction engineer	Mar. 19–20, 1915	183	163	91	55.8	72	44.2
19. Cook	July 31, 1915	37	37	33	89.2	4	10.8
20. Copyholder	Nov. 21, 1914	22	22	13	59.1	9	40.9
21. Cylinder pressman	Dec. 12, 1914	12	12	12	100	------	------
22. Dairyman, head	June 26, 1915	17	17	6	35.3	11	64.7
Dairyman, assistant	June 26, 1915	5	5	2	40	3	60
23. Deck hand	Sept. 19, 1914	79	79	45	56.9	34	43.1
24. Deputy mine inspector	June 19, 1915	10	10	7	70	3	30
25. Director Bureau of Tuberculosis	Sept. 4, 1915	13	11	4	36.4	7	63.6
26. Engineering assistant	Nov. 28, 1914	169	157	95	60.5	62	39.5
27. Engineering draftsman, Grade II	Feb. 26, 1915	76	66	22	33.3	44	66.7
28. Farm hand	May 22, 1915	20	20	9	45	11	55
29. Food chemist	Nov. 7, 1914	12	11	3	27.3	8	72.7
30. Game expert	Oct. 24, 1914	7	5	2	40	3	60
31. Hydrotherapy operator	Nov. 14, 1914	11	11	8	72.7	3	27.3
32. Laboratory helper	Jan. 23, 1915	4	8	4	50	4	50
33. Laborer	Aug. 17, 1915	397	367	95	25.9	272	74.1
34. Landscape gardener	Aug. 7, 1915	22	22	8	36.3	14	63.7
35. Library student	May 31, 1915	9	7	5	71.4	2	28.6
36. Linotype operator	Nov. 21, 1914	38	33	21	63.6	12	36.4
37. Marine engineer	June 5, 1915	36	36	32	88.9	4	11.1
38. Mech. engineering draftsman	Feb. 26, 1915	16	15	3	20	12	80
39. Messenger	Mar. 20, 1915	35	31	26	83.8	5	16.2
40. Messenger	Aug. 28, 1915	31	31	9	29.03	22	70.97
41. Milker	June 19, 1915	2	2	2	100	------	------
42. Office assistant	Aug. 14, 1915	67	67	15	22.4	52	77.6
43. Painter	Sept. 26. 1914	112	112	88	78.5	24	21.5
44. Parasitological entomologist	Feb. 6, 1915	2	2	1	50	1	50
45. Physician, assistant	Oct. 9–10, 1914	9	8	5	62.5	3	37.5
46. Pileman	Oct. 31, 1914	37	37	32	86.5	5	13.5
47. Platen pressman	Nov. 21, 1914	18	18	10	55.6	8	44.4
48. Printer, floor	Nov. 21, 1914	50	50	46	92	4	8
49. Proofreader	Nov. 21, 1914	25	25	16	64	9	36
50. Raftsman	Aug. 28, 1915	18	18	12	66.7	6	33.3
51. Repairer of office equipment	June 12, 1915	7	7	4	57.2	3	42.8
52. Safety engineer	June 19, 1915	97	86	24	27.9	62	72.1
53. Section hand	June 19, 1915	178	178	34	19.1	144	80.9

TABLE No. 2—Concluded.

Tabular Statement of Examinations Held and Results Obtained During Period From September 15, 1914, to September 15, 1915.

Kind of examination	Date	Number of applicants	Number examined	Number passed	Per cent passed	Number failed	Per cent failed
54. Shoemaker	Jan. 16, 1915	8	8	2	25	6	75
55. Stenographer	Aug. 14, 1915	320	320	98	30.6	222	69.4
56. Structural draftsman, Grade II	May 8, 1915	9	7	4	57.2	3	42.8
Structural draftsman, Grade I	May 8, 1915	6	5	4	80	1	20
57. Tailor	Jan. 30, 1915	5	5	2	40	3	60
58. Teamster	May 1, 1915	44	44	36	81.8	8	18.2
59. Telephone operator	Aug. 21, 1915	63	55	17	30.9	38	69.1
60. Tinner	Sept. 26, 1914	44	44	36	81.8	8	18.2
61. Vegetable gardener	July 3, 1915	6	6	4	66.7	2	33.3
62. Waiter	Oct. 3, 1914	6	6	4	66.7	2	33.3
63. Waiter	July 10, 1915	2	2			2	100
64. Waiter (camp)	Aug. 14, 1915	6	6	2	33.3	4	66.7
65. Waitress	Sept. 4, 1915	25	25	19	76	6	24
Total		4,273	4,076	1,548		2,528	
Average percentage					37.9		62.1

TABLE No. 3.

Tabular Statement of Examinations Held and Results Obtained During Period From September 15, 1915, to September 15, 1916.

Kind of examination	Date	Number of applicants	Number examined	Number passed	Per cent passed	Number failed	Per cent failed
1. Actuary (assistant)	Feb. 26, 1916	8	8	3	37.5	5	62.5
2. Asst. Dep. Supt. State Printing	July 29, 1916	9	8	1	12.5	7	87.5
3. Asst. Director Bur. Nurses' Reg.	April 15, 1916	7	6	2	33.3	4	66.7
4. Attendant (Agnews)	Dec. 10, 1915	57	57	42	73.6	15	26.4
5. Attendant (Mendocino)	Nov. 12, 1915	28	28	21	75	7	25
6. Attendant (Napa)	Nov. 5, 1915	70	70	55	78.6	15	21.4
7. Attendant (Norwalk)	Dec. 29, 1915	55	55	25	45.5	30	54.5
8. Attendant (Sonoma)	Nov. 11, 1915	46	46	41	89.1	5	10.9
9. Attendant (Southern California)	Sept. 20, 1915	56	56	49	87.5	7	12.5
10. Attendant (Veterans' Home)	Jan. 29, 1916	12	12	10	83.3	2	16.7
11. Attendant (Veterans' Home)	July 15, 1916	13	10	10	100	0	--------
12. Auditor	Oct. 1, 1915	121	109	40	36.7	69	63.3
13. Auditor	April 8, 1916	105	60	29	48.3	31	51.7
14. Baker	Jan. 8, 1916	10	10	9	90	1	10
15. Bank examiner	Mar. 1, 1916	63	62	12	19.3	50	80.7
16. Bindery help	Oct. 23, 1915	6	6	4	66.7	2	33.3
17. Boiler inspector	Oct. 2, 1915	23	23	8	34.8	15	65.2
18. Business manager	Dec. 15, 1915	55	55	15	27.3	40	72.7
19. Butcher	Jan. 8, 1916	13	13	8	61.5	5	38.5
20. Camp cook	May 20, 1916	5	4	4	100	0	--------
21. Chemist and bacteriologist	April 8, 1916	2	2	1	50	1	50
22. Civil engineer, Grade IV	Nov. 13, 1916	60	60	20	33.3	40	66.7
23. Clerk (chief)	May 27, 1916	196	180	31	17.2	149	82.8
24. Cook	Jan. 8, 1916	18	18	9	50	9	50
25. Custodian Union League Bldg.	Jan. 15, 1916	50	41	14	34.1	27	65.9
26. Dairyman	Jan. 22, 1916	10	10	6	60	4	40
27. Dairyman	Sept. 8, 1916	9	9	3	33.3	6	66.7
28. Dentist	Mar. 18, 1916	7	7	4	57.2	3	42.8
29. Deputy clerk Appellate Court	Aug. 26, 1916	50	42	20	47.6	22	52.4
30. Elevator inspector	Oct. 2, 1915	14	14	10	71.4	4	28.6
31. Engineering assistant	Oct. 30, 1915	115	115	56	48.7	59	51.3
32. Eng. Asst. Bur. Sanitary Eng.	June 10, 1916	2	2	1	50	1	50
33. Engineering draftsman, Grade II	Nov. 26–27, 1915	75	75	32	42.7	43	57.3
34. Engineering draftsman, Grade I	Nov. 26–27, 1915	21	18	15	83.3	3	16.7
35. Examining physician	Sept. 15, 1915	37	37	21	56.8	16	43.2
36. Fabric buyer	June 10, 1916	17	17	1	5.9	16	94.1
37. Farmer (head)	Feb. 12, 1916	----	------	7	---------	------	--------
		54	54	------	16.2	35	64.8
38. Farm hand	Feb. 12, 1916	----	-------	12	---------	------	--------
39. Farm hand	Dec. 4, 1915	80	80	26	32.5	54	67.5
40. Farm tractor operator	June 24, 1916	4	3	2	66.7	1	33.3
41. Field worker, Bureau Tuberculosis	Sept. 2, 1916	10	9	0	---------	9	100
42. Fish culturist	Jan. 3, 1916	1	1	1	100	0	--------
43. Fish and Game Com. (Deputy)	June and July, 1916	123	116	10	8.6	106	91.4
44. Garden laborer	Feb. 26, 1916	46	46	28	60.9	18	39.1
45. Gasoline launch operator	June 17, 1916	8	7	5	71.4	2	28.6
46. Graduate nurse	Oct. 12–13, 1915	72	72	21	29.2	51	70.8
47. Graduate nurse	Feb. 8, 1916	39	36	9	25	27	75
48. Graduate nurse	June 13, 1916	13	11	7	63.6	4	36.4
49. Hydrotherapist	May 27, 1916	6	4	3	75	1	25
50. Inspector Dept. Pet. and Gas	May 20, 1916	17	16	4	25	12	75
51. Janitor	April 22, 1916	167	123	100	81.3	23	18.7
52. Janitress	July 1, 1916	14	9	7	77.8	2	22.2
53. Laundress	Nov. 10 1915	22	18	12	66.7	6	33.3
54. Laundryman	Nov. 10, 1915	31	31	14	45.2	17	54.8
55. Locomotive engineer	April 15, 1916	38	30	12	40	18	60
56. Locomotive fireman	April 15, 1916	26	24	17	70.8	7	29.2
57. Messenger	Jan. 15, 1916	52	42	20	47.6	22	52.4
58. Messenger	June 10, 1916	15	14	5	35.7	9	64.3
59. Milker	July 1, 1916	4	4	4	100	0	--------

TABLE No. 3—Concluded.

Tabular Statement of Examinations Held and Results Obtained During Period From September 15, 1915, to September 15, 1916.

Kind of examination	Date	Number of applicants	Number examined	Number passed	Per cent passed	Number failed	Per cent failed
60. Office asst., Com. of Horticulture	Oct. 2, 1915	6	5	2	40	3	60
61. Office Deputy, Mining Bureau	Aug. 19, 1916	1	1	1	100	0	--------
62. Oil well driller	May 20, 1916	32	24	7	29.2	17	70.8
63. Parasitological entomologist	Dec. 18, 1915	3	3	1	33.3	2	66.7
64. Patcher	June 17, 1916	45	35	12	34.3	23	65.7
65. Patrolman	Dec. 1, 1915	253	253	75	70.4	178	29.6
66. Pharmacist	Dec. 18, 1915	21	20	14	70	6	30
67. Physician (assistant)	Jan. 21, 1916	24	20	5	25	15	75
68. Poultryman	Oct. 9, 1915	6	6	4	66.7	2	33.3
69. Poultryman	Feb. 26, 1916	9	9	5	55.6	4	44.4
70. Property agent, Board of Control	Aug. 19, 1916	5	5	2	40	3	60
71. Purchasing agent (assistant)	June 10, 1916	40	33	0	---------	33	100
72. Quartermaster commissary	July 8, 1916	17	15	2	13.3	13	86.7
73. Sanitary engineer (assistant)	April 8, 1916	6	6	1	16.7	5	83.3
74. Seamstress	Mar. 11, 1916	74	74	40	54.1	34	45.9
75. Shoemaker	Mar. 25, 1916	30	30	17	56.7	13	43.3
76. Special agent, Ind. Welfare Com.	Sept. 8, 1916	144	125	*	---------	-------	--------
77. Special agent, Inherit. Tax Dept.	April 29, 1916	99	91	32	35.2	59	64.8
78. Stenographer	April 8, 1916	469	330	117	35.5	213	64.5
79. Switchman	April 15, 1916	85	71	41	57.7	30	42.3
80. Testing engineer (senior asst.)	Mar. 4, 1916	4	4	2	50	2	50
81. Testing engineer (junior asst.)	Mar. 4, 1916	3	3	0	---------	3	100
82. Upholsterer	Feb. 26, 1916	14	14	13	92.9	1	8.1
83. Vegetable gardener	Feb. 19, 1916	10	10	5	50	5	50
84. Vegetable gardener	Aug. 5, 1916	4	4	0	---------	4	100
85. Veterinarian (Deputy State)	June 17, 1916	25	23	7	30.4	16	69.6
86. Waiter	July 1, 1916	6	5	3	60	2	40
87. Waitress	July 1, 1916	26	22	21	95.5	1	4.5
88. Watchman, Cal. School for Girls	Nov. 6, 1915	35	35	7	20	28	80
Total		3,783	3,246	1,394	---------	1,852	--------
Average percentage		-------	-------	-------	42.9	-------	57.1

*Incomplete.

PART II.

GENERAL RULES OF THE STATE CIVIL SERVICE COMMISSION.

RULE 1.

SECTION 1. "*Qualifications.*" Applicants must be citizens of the United States and actual residents of the State of California; they must be between the ages of 21 and 60 years unless otherwise specified by the Commission at the time of the announcement of the examination.

SEC. 2. *Character and Fitness.* Every applicant must be of good moral character, of temperate habits, and in all respects physically competent to perform the duties of the position applied for.

RULE 2.

Applications.

SECTION 1. All applications must be made upon official blanks furnished by the Commission and filled out as therein directed. Separate applications shall be made for—

(*a*) Positions as laborers;

(*b*) Positions in the trades and other skilled occupations;

(*c*) Positions requiring clerical, professional or scientific qualifications.

SEC. 2. *Applicants to Present Credentials.* Wherever written examinations are required, each applicant whose application has been approved shall be notified through the post office of the time and place of the examination, and such notice shall be the credential of the applicant to take the examination.

SEC. 3. *Laborer Applications.* Applicants for laborers' positions must not be over sixty years of age. Laborers shall be appointed according to priority of application, but all such applicants shall be examined as to age, residence, physical condition and experience, and must be found to be in good physical condition and with the capacity to perform hard manual labor.

Separate lists of applicants shall be made for laborers for Sacramento, San Francisco, and Los Angeles. The names of those laborers on the list for Sacramento shall be drafted for positions nearest Sacramento; names of those laborers on the list for San Francisco shall be drafted for positions nearest San Francisco; and the names of those laborers on the list for Los Angeles shall be drafted for positions nearest Los Angeles. When any of these lists become exhausted, names can be certified from the other lists.

All applications for laborers' positions must be on forms furnished by the Commission, and shall take precedence according to their receipt in the office of the Commission at Sacramento, each application being given a serial number in the order of its receipt by the Commission.

RULE 3.

Applications Not to Be Returned.

Applications and accompanying vouchers not returned for correction shall remain on file in the office of the Commission, and in no circumstance will be returned to applicants.

RULE 4.

Examinations.

SECTION 1. *Examinations to be Free.* All examinations shall be conducted under the supervision of the Commission without any cost or expense to any applicant, except for a medical certificate or examination when required.

SEC. 2. *Questions Placed Under Seal After Approval.* All examination questions shall be first approved by the Commission. The examination questions after approval shall be securely sealed with the official seal of the Civil Service Commission. The seal shall not be broken until the beginning of the examination, and then only in the presence of all the candidates at the examination and the authorized agent of the Civil Service Commission.

SEC. 3. *Explanations.* All necessary explanations will be made to the whole class. No question will be explained to any individual candidate. Examiners are forbidden to explain the meaning of, or to make remarks relating to, any question that may assist in its solution.

SEC. 4. *Conversation During Examinations.* Communication between candidates during examination is strictly forbidden.

SEC. 5. *Leaving the Examination Room.* During an examination no candidate will be permitted to leave the room, except in case of extreme necessity, and then only with a representative of the Commission. A luncheon recess may be allowed, however, at the direction of the Commission.

SEC. 6. *Limit of Time.* The limit of time prescribed for such examination will be stated before the examination and shall begin to run when announcement is made by the examiner in charge.

SEC. 7. *Helps.* Candidates are forbidden to receive aid from a fellow candidate or to use helps in any form. Before the commencement of an examination candidates will be required to hand to the examiner any printed or written matter in their possession that might serve to aid them in the examination. Evidence of copying or collusion may result in the cancellation of examination papers and the debarment of the candidate from future examinations. Copies of the questions in the examination may not be made or taken from the examination room.

SEC. 8. *Rating of Examinations.* All examinations shall be rated on a scale of 100, and the relative weights of the different subjects, including experience, shall be determined by the Commission at the time of the announcement of the examination.

SEC. 9. *Rating of Examination Papers.* Where written examinations are required they shall be so managed that no examination papers will disclose the name or identity of any applicant until all the examination papers shall have been marked.

Each candidate must write his name and address upon a declaration sheet, which must have printed upon it a serial number, to be known as his examination number.

The candidate shall mark upon each examination sheet his examination number only. When the examination papers have been rated the declaration sheet shall be unsealed and the examination papers assigned to the proper name of the person who wrote them.

So far as practicable, questions on different subjects of examination shall be answered on separate sheets and all the answers on a given subject shall be rated by the same examiner. Where the number of examiners will permit, the answers shall be redistributed by subjects for review by other examiners after being rated in the first instance.

SEC. 10. *Identification Marks.* Any candidate in any examination who places an identification mark upon his examination papers, other than his serial number, may be deprived of all benefits under such examination.

The following are marks of identification within the meaning of this rule: name or address of the candidate; any assumed or fictitious name or address; any initials, lines or other characters that might indicate the identity of the candidate.

SEC. 11. *Marking and Grading of Papers. Relative Weights, and Method of Determining Average Percentage.* The relative weight of each subject shall be fixed and announced by the Commission, and all examination papers shall be marked and graded under the regulations of the Commission. When, during the marking and grading of the papers, it becomes apparent that a candidate, whose papers have been partially marked, would receive a general average percentage less than the minimum percentage for eligibility fixed by the Commission, or if the candidate receives less than the minimum percentage required by the Commission on a given subject, then such candidate shall be considered as having failed and the marking of his papers need not be completed.

The different subjects in each examination are given relative weights according to their importance. These weights represent the value of each subject in the whole examination. The method of obtaining the average percentage of the examination is as follows: Multiply the rating obtained in each subject by the relative weight of that subject, add the products, and divide the sum of the products by the sum of the relative weights. The quotient thus obtained will be the average percentage for that examination.

SEC. 12. *Minimum Standing.* Candidates shall be required to obtain a general average of not less than 70 per cent in order to pass an examination.

SEC. 13. *Notice of Result of Examinations.* As soon as the marking and grading of the papers shall have been completed and the eligible registers established, each candidate shall be notified through the post office of his general average percentage and relative standing obtained upon examination.

Where the marking of the examination papers has not been completed because the candidate has failed in any given subject, he shall be notified of that fact.

SEC. 14. *Appeal for Review.* Any applicant may appeal to the Civil Service Commission to have his examination papers reviewed on the ground of errors committed therein, if said appeal is made in writing within thirty days after receiving announcement of the result of the examination. Upon a review of the examination papers of the applicant, his rating may be changed in accordance with such review. If, in the judgment of the Commission, such review discloses errors on the part of the examiner affecting the examination papers of all the applicants, then all the examination papers may be reviewed.

RULE 5.

Eligible Registers.

SECTION 1. Successful candidates shall be enrolled upon the register of eligibles in the order of their general average percentage upon examination without regard to priority of application or examination, except that two or more candidates receiving the same percentage shall be enrolled according to the percentage attained in the chief essential of the examination.

SEC. 2. Successful candidates may be enrolled upon two or more eligible registers at the same time.

RULE 6.

Certifications.

SECTION 1. *Vacancies.* Whenever a vacancy is to be filled the appointing power shall notify the Commission of that fact, stating the duties of the position.

SEC. 2. *Three Names to be Certified.* The Commission shall then certify to the appointing power the names and addresses of three persons who stand highest on the eligible list for the class or grade to which the position belongs. In case there are less than three upon such eligible list the Commission shall certify the number thereon and the appointing power shall fill the position by the appointment of one of the persons certified by the Commission. Where the employment is for a period of sixty days or less, the Commission may certify only those names of eligibles who live in the vicinity of the employment.

If an appointing power have at the same time more than one vacancy in the same class and grade to be filled, the Commission shall certify in the manner previously set forth as many names as there are vacancies, and two names in addition to the total number of such vacancies if there be that number of names on the register.

The appointing power shall fill the first vacancy by the selection of one of the highest three eligibles so certified. The second, and any succeeding vacancy, shall be filled in like manner by selection in turn from the highest three remaining names.

If, in any case indicated, there be no additional name or names on the register, or if the number of names which can be certified or which are finally available for appointment be less than the number specified in this rule but at least equal to the number of vacancies to be filled, then the required selection shall be made from the names certified and available.

SEC. 3. *Next in Rank After Waiver.* Whenever an eligible has been certified to the appointing power, and such eligible waives appointment, the secretary shall forthwith notify the appointing power of such waiver and certify the next highest eligible, whereupon said next highest eligible shall have the same standing as though originally certified.

SEC. 4. *New Positions.* Whenever a new position is created, the appointing power who may fill such position shall immediately make requisition upon the Civil Service Commission for an eligible to fill the position, and shall at the same time furnish the Civil Service Commission with a detailed statement of the duties attached to said position. It shall then be the duty of the Civil Service Commission to classify said position and to certify eligibles in accordance with the provisions of section 2 of this rule.

SEC. 5. *Examination Papers to be Forwarded With Certification.* Upon certifying eligibles to any appointing power to fill a vacancy, the examination papers of the eligibles shall be transmitted with the notice of certification if required by the appointing power. Within ten days thereafter all examination papers must be returned to the Commission by the appointing power.

RULE 7.

Failure to Respond.

SECTION 1. Any eligible who fails to respond within a reasonable time after notice has been sent him to report for duty will be stricken from the eligible register, unless, within thirty days from the date of the notice sent him, he presents reasons satisfactory to the Commission for his failure to report.

When the eligible resides in the city from which the notice has been sent three days shall be deemed a reasonable time in which to respond. When the eligible resides in some other city or county the time consumed in transmission of the letter to his place of residence and return shall be added to the three days.

SEC. 2. Any eligible who fails to respond within a reasonable time after any notice sent him by the Commission requiring an answer will be stricken from the eligible register, but may be restored if at any time during the period of his eligibility he presents reasons satisfactory to the commissioners for his failure to respond.

RULE 8.

Declination and Waiver of Certification.

SECTION 1. An eligible may at any time have his name temporarily withdrawn from the eligible register upon giving reasons in writing satisfactory to the Commission, and may be restored thereto at the discretion of the Commission upon making application in writing during the period of his eligibility.

SEC. 2. An eligible may, when his name is reached for appointment to a temporary position, waive certification without losing his position upon the eligible register. A temporary position is one that will last for less than six months.

SEC. 3. Whenever an eligible has indicated the locality or institution in which he will accept employment, he may decline certification to positions in other localities or institutions, without losing his position upon the eligible register.

An eligible may decline appointment after certification without losing his position upon the eligible register for any reason satisfactory to the Civil Service Commission.

In the event of an absolute refusal of a permanent position by an eligible for reasons that are not satisfactory to the Civil Service Commission his place upon the eligible register shall be declared vacant and his name shall be removed therefrom. The Commission may in its discretion, however, restore his name to the eligible register for the remaining period of his eligibility upon his written application therefor.

RULE 9.

Appointments.

SECTION 1. *Probationer.* A probationer is one in office more than sixty days previous to classification by the Civil Service Commission, November 14, 1913, and also less than a year previous to August 15, 1913; or one who having been certified and appointed after examination has been employed less than six months.

The probationary period for any appointment is hereby fixed at six months.

SEC. 2. *Permanent Appointments.* A permanent appointee is one who was in office August 15, 1913, and who had been employed for more than one year previous to that date, or one who, having been a probationer, has served more than the required probationary period of six months.

SEC. 3. *Temporary Appointments.* A temporary appointee is one who has been appointed to office after August 15, 1913, without examination, and with the previous consent of the commission.

Whenever a position is to be filled, the appointing power must make application in writing to the Civil Service Commission to fill the same by the certification of three eligibles in accordance with section 9 of the Civil Service Act.

When there are no eligibles from which to fill the position, the Civil Service Commission may authorize the appointing power to fill such position by temporary appointment to last not exceeding ninety days from date of appointment. Until such permission has been given no authority exists in the appointing power to make a temporary appointment.

Pending the holding of examinations for the various positions in the State Civil Service, it will be necessary for positions to be filled by temporary appointment. All contemplated appointments for at least three months should be included in the request for certification of eligibles to the appointing power. The Civil Service Commission will then pass on the applications and notify the appointing power in writing of the certification of eligibles; or of its permission to make temporary appointments. If the permission is granted, then and not until then, the appointing power may make legal appointments.

Upon making the appointment it will be incumbent upon the appointing power to notify the commission, naming the appointee, the title and character of the position, the date of commencement of service, and salary or compensation thereof, as required by section 16 of the Civil Service Act.

SEC. 4. *Emergency Appointments.* Emergency appointments are those made notwithstanding there may be an eligible list, for the reason that eligibles are not immediately available. In certain departments of the state men are employed and discharged almost daily, but they are at such great distance from the heads of their departments that in some cases word can not be got either to or from them for several days. In order to prevent the stoppage of public business when the necessity of making short-time appointments exists, permission is hereby granted to the appointing power in any department of the State Civil Service to make emergency appointments for not more than fifteen days. The name of the appointee, the duties of the position, the nature of the emergency, and the further data required by section 16 of the Civil Service Act must be mailed to the State Civil Service Commission.

Where the appointing power is sufficiently near Sacramento to make application for a temporary appointment with the previous consent of the Commission, a resort to emergency appointments will be deemed an abuse of the privilege of this rule.

Emergency appointments may not be continuous.

RULE 10.

Report of Appointment.

Whenever the names of three eligibles have been certified to the appointing power to fill a vacancy, it shall be the duty of the appointing power to make the appointment forthwith. It shall also be the duty of the appointing power to make immediate report to the Commission of the fact of appointment.

RULE 11.

Efficiency Records.

In all offices and places of employment subject to the Civil Service Act, the appointing power shall make records of the individual efficiency of holders of positions in performing their duties and shall file such records monthly with the Civil Service Commission on or before the fifth day of the month succeeding that in which the records were made.

The efficiency records shall be rated upon:

First. Quality—Meaning the ability of an employee to perform the task to which he or she is assigned, and the degree of excellence attained in its performance. Cognizance should be taken of such qualities as neatness of work, originality, resourcefulness, initiative, sense of order, system, judgment, tact, special knowledge, technical ability, mechanical skill and ability to direct work and to manage men.

When "temperamental qualities" determine the usefulness of employees, as in the case of teachers in a reform school, or nurses in an institution, "temperamental aptitude" shall be rated under quality.

Second. Quantity—Meaning the amount of work done. In cases where the work is not measurable, ratings should be on alertness, or promptness, speed, industry, perseverance, energy, diligence and willingness to work.

Third. Discipline—Including treatment of the public, treatment of fellow employees, sobriety, obedience to rules, and personal neatness.

Fourth. Attendance—Including absence and punctuality.

Quality and quantity of work shall be rated on a percentage basis.

The grading shall be as follows:

For excellent or exceptional work	90–100
For good or thoroughly satisfactory work	80– 90
For fair or not wholly satisfactory work	70– 80
For poor or unsatisfactory work	70 and below

Eighty-five per cent is arbitrarily taken by the Civil Service Commission as the marking for an average employee doing thoroughly satisfactory work.

Where markings above 90 per cent or below 70 per cent are reported, an explanation should accompany, stating briefly the reason therefor. The Civil Service Commission retains the right to investigate such ratings before entering them upon its records.

Attendance shall be recorded by demerits:

Tardiness—1 demerit for 5 minutes or less; 3 demerits for more than 5 minutes and not exceeding one hour; 5 demerits for more than one hour.

Absence without leave—5 demerits for each day, same to be noted by an accompanying star (*). (Absence without leave for one or more days in any one month shall be cause for investigation by the Civil Service Commission.)

Absence with leave not exceeding 15 days, half a demerit for each day of said period; 1 demerit for each day in excess thereof. A period so penalized shall not be for more than one month. Absence on sick leave not exceeding 30 days, half a demerit for each day.

An employee is considered present when detailed on special work and during his vacation.

No efficiency credit shall be allowed for overtime work.

Discipline shall be recorded in demerits:

Penalties to be given for laxity in observance of or violation of established rules and regulations, failure to report, incivility, deportment, manner, inebriety, indolence, personal neatness, and habits. If suspension is imposed for disciplinary purposes, the demerits under "discipline" shall be as follows:

For a suspension of 1 day	10 demerits
For a suspension of more than 1 day and less than 7 working days	15 demerits
For more than 6 and less than 13 working days	25 demerits
For more than 12 and less than 28 working days	40 demerits

When demerits are so made, there shall not be any penalty under "attendance" for the suspension period.

The total demerits reported with any individual record shall be added, the sum divided by 5 and the result subtracted from the average marking for quantity and quality of work. The remainder shall be entered on the report as the net efficiency.

If the net efficiency of any employee falls below 70 for any one month, the secretary of the commission may file a charge of inefficiency against such employee with the Civil Service Commission. If such charge is filed, it shall be the duty of the Civil Service Commission to try the said employee for inefficiency. If, after such trial, it shall find the ratings to be just, the Civil Service Commission shall enter judgment, removing the said employee from the Civil Service of the state of California, and his name shall be stricken from the list of eligibles.

In case the net efficiency of an employee shall fall below 80 continuously for three months, the Commission may reduce the salary or grade of such employee.

The efficiency records of any office or department shall be made upon a letter-size form, at the left of which shall be a column for the names of the employees in the said office or department arranged alphabetically. In the first column to the right of the name shall be written the name of the position; in the second column the salary paid; in the third column shall be rated the attendance, and it shall be in a double subcolumn in which shall be recorded demerits for tardiness, and in the second subcolumn shall be recorded the demerits for absence; in the fourth column shall be recorded discipline demerits; in the fifth column shall be rated quality of work; in the sixth column shall be rated the quantity of work; and three columns shall be left at the extreme right for noting the average positive per cent rating, the total number of demerits and the net efficiency.

The appointing power shall require the immediate supervisor of the persons whose efficiency records are being made up to certify to the appointing power, the record for the quantity and quality work, discipline and attendance. From the record thus transmitted to the appointing power or its authorized agent by the said immediate supervisor, the appointing power or its authorized agent shall cause to be made the entries in the efficiency records to be submitted to the Civil Service Commission. A copy of said record shall be kept in the office of the appointing power.

RULE 12.

Leaves of Absence.

SECTION 1. *Vacation.* (*a*) Each employee regularly employed in the service of the state, who shall have been employed for a period of not less than six months, shall be allowed, during each year of his service, a vacation of not less than fifteen working days duration; said vacation to be without loss of pay and the time allowed for said vacation to be designated by the appointing power.

(*b*) Such vacation shall not be cumulative; that is, if not taken one year, the employee will not be entitled to thirty days the next year.

SEC. 2. *Sick Leave.* (*a*) When a state employee is prevented by sickness from reporting for duty, or when some member of his family is afflicted with contagious disease, as a result of which his presence in the service would jeopardize the health of fellow employees, he must immediately send notice thereof to his superior, and thereafter shall be granted sick leave.

(*b*) Employees claiming sick leave must furnish the State Civil Service Commission with a medical certificate showing that they have been actually disabled from performing work, and from and to what dates. Where the person claiming sick leave is working at an institution where the state has physicians employed, the certificate may be made by any such physician. Those working in a department where a physician is not employed must furnish a certificate from some responsible physician. Certificate forms may be secured from the State Civil Service Commission and must be approved by the appointing power before forwarding to the office of the State Civil Service Commission. Where the leave is for five days or less the certificate may be signed by only the appointing power, if he so elects.

(*c*) If an employee has held a position in the state service continuously for six months immediately preceding sick leave, he may upon the recommendation of the appointing power, be granted full pay until recovery, provided the same shall not exceed seven days.

(*d*) If an employee has held a permanent position in the state service continuously for one year immediately preceding sick leave, he may upon recommendation of the appointing power, be granted full pay until recovery, providing the same shall not exceed fifteen days, upon proper showing made to the State Civil Service Commission and the State Board of Control.

(*e*) In exceptional cases, upon proper showing to the State Civil Service Commission and the State Board of Control the leave may be extended for a total of thirty days at full pay and thereafter sixty days at half pay; no leave, however, shall exceed ninety days in any year of service.

SEC. 3. *Special Leave.* Leave without pay, if requested in writing by a state employee, may be granted for a period of not to exceed one year, if recommended by the appointing power and approved by the State Civil Service Commission; *provided*, that leave of absence for less than thirty days may be granted by the appointing power without the approval of the Commission.

SEC. 4. *Reemployment After Leave.* A position shall be held open for an employee when on sick leave for ninety days or when on a special leave for not exceeding thirty days. When an employee is absent on special leave exceeding thirty days he shall not be entitled as of right to be restored to the position he formerly occupied, except on the request of the appointing power and approval of the State Civil Service Commission. He shall with the approval of the Commission, be entitled, unless restored to the position he formerly occupied, to be placed on the lay-off list.

RULE 13.

Absence Without Leave.

SECTION 1. Absence from duty without leave for any time will be considered good cause for dismissal.

SEC. 2. Absence from duty without leave for ten consecutive days shall be deemed a resignation from the service by the absentee, and upon the report of such absence by the appointing power to the Civil Service Commission, the absentee shall be removed from the service of the state, and the fact of removal shall be entered in the official roster; *provided*, that if at any time within thirty days the person so absenting himself shall make satisfactory explanation to the Civil Service Commission of the cause of his absence he shall be restored to his position.

RULE 14.

Reduction in Force.

SEC. 1. Whenever it becomes necessary to reduce the number of employees in a given class, they shall be laid off according to their records of efficiency and their names entered upon the departmental lay-off list. When no such records have been kept, they shall be laid off at the discretion of the appointing power. The order of reemployment shall be determined by the Commission on the basis of efficient service. Certification from the departmental lay-off list shall be in advance of certification from any other list. The Commission may make separate provision for the reemployment of persons having special qualifications.

SEC. 2. Employees desiring reemployment in other departments may request that their names be placed upon the general lay-off list for their class and grade. After investigation, by the Commission, their names will be entered upon such list in accordance with their records of service and seniority, as determined by the Commission, provided such records are satisfactory. Certification will be in advance of and made in the same manner as from the eligible register. Where, however, there are less than three names upon any general lay-off list, a sufficient number of names to make three shall be added from the eligible register for the same class and grade. The Commission may make separate provision for the certification from the general lay-off list of persons having special qualifications. The period of eligibility for both the general and departmental lay-off lists will be the same as for an eligible register.

SEC. 3. The names of those laid off during their probationary period will be restored to the eligible register in accordance with their original rank. No permanent employee shall be laid off while probationers in the same department are doing work for which the permanent employee is fitted.

RULE 15.

Transfer.

Transfers, as provided by section 13 of the Civil Service Act, may be made by the appointing power only with the previous consent of the Civil Service Commission.

Eligibles appointed after examination to fill a position in a given class may not be transferred to positions in another class.

RULE 16.

Resignation or Relinquishment of Position.

SECTION 1. When a civil service appointee desires to resign his position he shall present his resignation, in writing, to the power that appointed him, and a copy of such resignation shall immediately be filed by the appointing power with the Civil Service Commission, together with a statement from the appointing power of the action taken thereon. An appointee so resigning from the service may within one year, with the recommendation of appointing power, be reinstated to the position from which he was separated or a similar position in the same department if there be need for his services, upon petition to and favorable action by the Civil Service Commission.

SEC. 2. The Civil Service Commission may, when in its judgment there appear good and sufficient reasons, permit a civil service appointee to relinquish his position and place his name upon the general lay-off list, provided such appointee shall make application for such action in person or in writing and provided further that if such an appointee be permitted to relinquish his position under this section he shall not again be considered for any appointment in the class he vacated until at least 90 days thereafter have expired, nor shall he ever again be considered for reappointment to the same department to the kind of position he relinquished except with the consent of the appointing power.

SEC. 3. An appointee to a temporary position as defined by rule 8, section 2, may, with the consent of the appointing power, and the Civil Service Commission, be permitted to relinquish such position and such relinquishment shall be deemed to be a waiver of all other temporary employments until a withdrawal of waiver is filed with and acted upon by the Commission.

RULE 17.

Promotion.

SECTION 1. *Method of Promotion.* Vacancies in positions, unless filled by reinstatement or transfer, shall be filled so far as practicable by promotion from among persons holding positions in the next lower grade of the department, office, or institution in which the vacancy exists. An increase of salary beyond the grade of the position occupied shall be deemed a promotion.

Promotion shall be based upon merit determined by competitive examinations and by the superior qualifications of the person promoted, as shown by his record of efficiency. Applicants for promotional examinations shall register in the office of the Commission at least three days before the date fixed for the examination.

The recommendation of the appointing power, with reasons for the recommendation, shall be a factor in all promotional examinations, and shall be given a rating to be determined by the Commission upon the announcement of the examination.

Whenever a vacancy is to be filled by promotion, and the number of applicants in the next lower grade who present themselves for examination are so few that in the judgment of the Commission the good of the public service requires that such promotion shall be open to all employees in the lower grades of that class, it shall so declare and notify all employees in such lower grades that such examination will be held and of their eligibility, and shall proceed to hold an original competitive examination to fill such positions.

RULE 18.

Trials and Dismissals.

SECTION 1. Charges under section 14 of the Civil Service Act may be made by the appointing power or its representative, the Civil Service Commission or its representatives, or any citizen.

Such charges shall be tried either by the appointing power or the Civil Service Commission, and shall be instituted by serving upon the defendant a written complaint setting forth the grounds for removal with such particularity as shall enable the defendant to understand clearly the charges made against him, and filing with the Civil Service Commission a copy thereof.

Within ten days after service upon him of the complaint, the defendant shall file with the Commission and furnish to the prosecutor a written answer thereto.

The appointing power, in case the charges are to be heard by it, shall then notify the defendant and the Civil Service Commission of the time and place of hearing of said charges, and in case the Civil Service Commission shall hear said charges it shall notify the defendant and the prosecutor of the time and place of hearing said charges.

The time of hearing shall not be less than five nor more than ten days from the service upon the prosecutor of the answer of the defendant.

The defendant at such hearing shall have opportunity to present whatever competent evidence he may desire in his own defense and shall have the right to be represented by counsel. Failure to file an answer within the time allowed shall be construed as an admission of the truth of the charges by the defendant, and judgment of removal shall be entered forthwith and filed with or by the Commission.

Either the appointing power or the Commission may transfer charges to the other for action or investigation.

SEC. 2. The hearing of charges may be by the Commission, any commissioner, the chief examiner or any other agent of the Commission as it may direct, or the appointing power.

SEC. 3. Any civil service appointee dismissed from employment after trial shall be removed forthwith from all eligible lists and shall not be eligible for examination thereafter without the consent of the Commission. Any eligible or appointee convicted of a felony shall be dismissed from the service of the state and shall have his name stricken from all eligible registers.

RULE 19.

Where any position involves the handling of cash an eligible certified to such position and appointed by the appointing power shall be required to furnish a bond in the sum nominated by the appointing power and approved by the State Civil Service Commission.

RULE 20.

Regular and Special Meetings.

Regular meetings shall be held on the first Tuesday of every month in the office of the Commission at the State Capitol, Sacramento, at 10 o'clock a. m.

Special meetings may be called at any time by the president or by a majority of the commissioners, provided forty-eight hours notice of such special meeting be given to all members of the Commission. A notice of each special meeting shall state the business for which said meeting is called, but any other business may be transacted at such meeting. Ordinary parliamentary rules shall govern the deliberations of the Civil Service Commission.

RULE 21.

Public Inspection.

All the books, records, answers and papers pertaining to examinations or other proceeding shall be open to the inspection of any citizen.

RULE 22.

Amendments to Rules.

The rules of the Civil Service Commission may be amended at any meeting.

PART III.

CLASSES

IN

THE CLASSIFICATION OF THE SERVICE.

A. Agricultural Service.
B. Charge Service.
C. Custodian Service.
D. Domestic Service.
E. Engineering Service.
F. Inspection Service.
G. Labor Service.
H. Legal Service.
I. Library Service.
J. Medical Service.
K. Nursing Service.
L. Clerical Service.
M. Operating Engineering Service.
N. Scientific Service.
O. Skilled Labor Service.
P. Teaching Service.
Q. Warden Service.
R. Supervising Service.

CLASSIFICATION.

CLASS A. Agricultural Service.

Class A shall include all offices and places, the duties of which require a knowledge of agricultural work or some branch thereof.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class A, is as follows:

Grade I. Shall include all offices and places, the duties of which involve responsibility for the performance of definitely assigned duties of a low order.

Range of compensation, $25.00–$50.00.

Grade II. Shall include all offices and places, the duties of which are similar to Grade I, but of a higher order.

Range of compensation, $50.00–$75.00.

Grade III. Shall include all offices and places, the duties of which involve a high order of specialized knowledge or skill, or are supervisory, involving the direction of others in the same line of work.

Range of compensation, $75.00–$100.00.

Grade IV. Shall include all offices and places, the duties of which are supervisory and educational, requiring advanced training in the science of agriculture, or some branch thereof.

Range of compensation, $100.00–$150.00.

Subclasses:

1. Dairyman—Grades I, II, III.
2. Farmer—Grades I, II, III.
3. Garden laborer—Grades II, III.
4. Gardener, landscape—Grades II, III, IV.
5. Gardener, vegetable—Grades I, II, III.
6. Milker—Grades I, II.
7. Pasteurizer—Grades I, II.
8. Poultryman—Grades I, II, III.
9. Stableman—Grades I, II.
10. Supervisor of farm, Whittier State School—Grades III, IV.

CLASS B. Charge Service.

Class B shall include all offices and places, the duties of which involve the supervision, custody, or care of persons who are public charges.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class B, is as follows:

Grade I. Shall include all positions, the duties of which involve fixed responsibility, but which are not supervisory.

Range of compensation, $30.00–$50.00.

Grade II. Shall include all positions, the duties of which are similar to Grade I, but of a higher order.

Range of compensation, $50.00–$60.00.

Grade III. Shall include all positions, the duties of which involve the exercise of independent judgment and accountability for the work of others.

Range of compensation, $60.00–$75.00.

Grade IV. Shall include all positions, the duties of which are similar to Grade III, but of a higher order.

Range of compensation, $75.00–$100.00.

Grade V. Shall include all positions, the duties of which require a high order of specialized knowledge.

Range of compensation, $100.00–$150.00.

SUBCLASSES:

1. Attendant—Grades I, II, III, IV.
2. Company Captain—Grades II, III, IV, V.
3. Housemother, California School for Girls—Grades I, II, III, IV.
4. Matron, Harbor Commission—Grade I, II, III, IV.
5. Matron, state hospitals—Grades III, IV, V.
6. Matron, state reform schools—Grades I, II, III.
7. Supervisor, state hospitals—Grades III, IV, V.
8. Supervisor of boys, School for Deaf and Blind—Grades I, II, III.
9. Supervisor of girls, School for Deaf and Blind—Grades I, II, III.
10. Yard officer, California School for Girls—Grades I, II, III, IV.

CLASS C. Custodian Service.

Class C shall include all offices and places, the duties of which involve the custody or care of public property, buildings and grounds.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class C, is as follows:

Grade I. Shall include all positions, the duties of which involve fixed responsibility, but which are not supervisory.

Range of compensation, $50.00–$75.00.

Grade II. Shall include all positions, the duties of which are substantially as in Grade I, but of a higher order.

Range of compensation, $75.00–$100.00.

Grade III. Shall include all positions, the duties of which are largely supervisory, involving accountability for the work of others.

Range of compensation, $100.00–$125.00.

Grade IV. Shall include all positions, the duties of which involve responsibility for the work of a minor division, or are substantially the same as in Grade III, but of a higher order.

Range of compensation, $125.00–$175.00.

SUBCLASSES:

1. Caretaker safety museum, Industrial Accident Commission—Grades III, IV.
2. Custodian, Union League Building—Grades II, III, IV.
3. Janitor—Grades I, II, III, IV.
4. Janitress—Grades I, II.

5. Policeman—Grades II, III.
6. Porter, state hospitals—Grades I, II.
7. Porter, State Printing Office—Grades I, II.
8. Watchman—Grades I, II.
9. Watchman, California School for Girls—Grades I, II.
10. Watchman, state reform schools—Grades I, II.

CLASS D. Domestic Service.

Class D shall include all offices and places, the duties of which involve work in connection with domestic routine or household management.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class D, is as follows:

Grade I. Shall include all positions, the duties of which involve responsibility for the performance of definitely assigned duties.

Range of compensation, $30.00–$50.00.

Grade II. Shall include all positions, the duties of which are substantially the same as in Grade I, but of a higher order.

Range of compensation, $50.00–$75.00.

Grade III. Shall include all positions, the duties of which are largely supervisory, involving accountability for the work of others, or requiring a high order of specialized skill.

Range of compensation, $75.00–$100.00.

Grade IV. Shall include all positions, the duties of which are supervisory, involving the responsibility for an entire division or department.

Range of compensation, $100.00–$150.00.

SUBCLASSES:

1. Baker—Grades II, III.
2. Butcher—Grades I, II.
3. Camp cook—Grades II, III.
4. Camp waiter—Grades I, II.
5. Cook—Grades I, II, III, IV.
6. Dining-room helper—Grades I, II.
7. Housekeeper—Grades I, II.
8. Kitchen help—Grades I, II.
9. Laundress—Grades I, II.
10. Laundryman—Grades I, II, III.
11. Seamstress—Grades I, II.
12. Servant—Grades I, II.
13. Waiter—Grades I, II.
14. Waiters—Grades I, II.

CLASS E. Engineering Service.

Class E shall include all offices and places, the duties of which require training and ability in civil, mechanical or electrical engineering, architecture or related technical work.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class E, is as follows:

Grade I. Shall include all positions, the duties of which require some skill and accuracy and a general training, but not necessarily much practical experience.

Range of compensation, $40.00–$100.00.

Grade II. Shall include all positions, the duties of which require training, experience and ability, involving fixed responsibility, and may or may not be supervisory.

Range of compensation, $100.00–$150.00.

Grade III. Shall include all positions, the duties of which are supervisory, involving independent judgment and accountability for the work of others and for a definite part of an engineering work. Also positions requiring a high order of specialized knowledge and professional ability, but not necessarily supervisory.

Range of compensation, $150.00–$200.00.

Grade IV. Shall include all positions, the duties of which are administrative, requiring special qualifications and recognized expert knowledge, and involving responsibility for the work of a minor department, under the head thereof, or entire responsibility for a division or minor bureau.

Range of compensation, $200.00–$300.00.

Grade V. Shall include all positions, the duties of which are executive and administrative, involving entire responsibility for an important department or bureau, either independently or directly under the head or heads of such department or bureau.

Range of compensation, $300.00 and above.

SUBCLASSES:

1. Architectural draftsman—Grades I, II, III.
2. Assistant engineer, Harbor Commission—Grades III, IV, V.
3. Assistant State Architect—Grade IV.
4. Assistant State Engineer—Grade IV.
5. Blue print pressman—Grades I, II.
6. Boiler engineer, Industrial Accident Commission (*see* safety engineer).
7. Building estimator—Grades I, II, III.
8. Civil engineer—Grades I, II, III, IV, V.
9. Construction engineer—Grade III.
10. Construction engineer, Industrial Accident Commission (*see* safety engineer).
11. Electrical engineer—Grades II, III, IV.
12. Electrical engineer, Industrial Accident Commission (*see* safety engineer).
13. Electrical engineering draftsman—Grades I, II, III.
14. Engineering assistant—Grades I, II.
15. General engineer, Industrial Accident Commission (*see* safety engineer).
16. Geological draftsman—Grades I, II, III.
17. Hydrographic engineer, Water Commission—Grades II, III, IV.
18. Mechanical engineer—Grades III, IV.
19. Mechanical engineering draftsman—Grades I, II.
20. Mining engineer, Corporation Department—Grades III, IV.
21. Safety engineer, Industrial Accident Commission—Classified as boiler engineer, construction engineer, electrical engineer, general engineer—Grades II, III, IV.
22. Specification writer—Grades II, III.
23. Structural draftsman—Grades I, II.
24. Structural engineer—Grades II, III, IV.
25. Topographical draftsman (student)—Grades I, II.

CLASS F. Inspection Service.

Class F shall include all offices and places, the duties of which involve the inspection of materials, workmanship, or conditions, and which are not included in other classes.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class F, is as follows:

Grade I. Shall include all positions, the duties of which require skill, experience, and specialized knowledge, and involve the exercise of independent judgment.

Range of compensation, $75.00–$100.00.

Grade II. Shall include all offices and places, the duties of which may be supervisory, and which require experience, special knowledge and ability, involving fixed responsibility and the exercise of independent judgment.

Range of compensation, $100.00–$150.00.

Grade III. Shall include all offices and places, the duties of which are largely supervisory, involving accountability for the work of others, and the conduct of an entire administrative branch or division of such branch. Also position involving a high degree of specialized knowledge.

Range of compensation, $150.00–$200.00.

SUBCLASSES:

1. Apple packing inspector—Grades I, II, III.
2. Boiler inspector, Industrial Accident Commission (*see* safety inspector).
3. Bricklaying inspector—Grades II, III.
4. Complaint investigator, Immigration and Housing Commission—Grades I, II, III.
5. Crawfish inspector—Grade I.
6. Dairy inspector—Grade II.
7. Detective, Board of Dental Examiners—Grades II, III.
8. Elevator inspector, Industrial Accident Commission (*see* safety inspector).
9. Engineering inspector, Harbor Commission—Grades II, III.
10. Field agent, Bureau of Labor Statistics—Grades I, II, III.
11. Field worker, Whittier State School—Grades I, II.
12. Food and drug inspector—Grades II, III.
13. Inspector of building construction—Grades I, II, III.
14. Inspector of general construction—Grades I, II, III.
15. Inspector, Department of Petroleum and Gas, Mining Bureau—Grades II, III.
16. Inspector of road construction—Grades I, II, III.
17. Investigator, Industrial Accident Commission—Grades II, III.
18. Investigator and expert statistician, Immigration and Housing Commission—Grades I, II, III.
19. Live stock inspector—Grades I, II.
20. Mine inspector, Industrial Accident Commission—Grades II, III.
21. Motor vehicle inspector—Grades II, III.
22. Number plates inspector, Motor Vehicle Department—Grades II, III.
23. Patrolman, Highway Commission—Grades I, II.
24. Pharmacy inspector—Grades I, II, III.
25. Piledriver inspector—Grades II, III.
26. Piping inspector—Grades II, III.
27. Plumbing inspector—Grades II, III.
28. Quarantine inspector, Commission of Horticulture—Grades I, II, III.
29. Safety inspector, Industrial Accident Commission, classified as boiler inspector, elevator inspector—Grades II, III.
30. Sanitary inspector, Board of Health—Grades II, III.
31. Sanitation inspector, Immigration and Housing Commission—Grades II, III.
32. Special agent, Board of Charities and Corrections—Grades I, II.
33. Special agent, Immigration and Housing Commission—Grades I, II.
34. Special agent, Industrial Accident Commission—Grades I, II.
35. Special agent, Industrial Welfare Commission—Grades I, II.
36. Special agent, Inheritance Tax Department—Grades II, III.
37. Special agent, Bureau of Labor Statistics—Grades I, II.
38. Special agent, Board of Medical Examiners—Grades I, II.
39. Special agent, Social Insurance Commission—Grades I, II.
40. Special agent, Water Commission—Grades II, III.
41. Testing inspector, Harbor Commission—Grades II, III.
42. Unemployment and general investigator, Immigration and Housing Commission—Grades I, II, III.

CLASS G. Labor Service.

Class G shall include all places of persons rendering common labor service.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class G, is as follows:

Grade I. Shall include all positions of persons rendering common labor service.
Range of compensation, $25.00–$75.00.

Grade II. Shall include all positions, the duties of which are supervisory, involving accountability for the work of a gang or crew of unskilled laborers.
Range of compensation, $75.00–$100.00.

Grade III. Shall include all positions, the duties of which are similar to Grade II, but of a higher order.
Range of compensation, $100.00–$150.00.

SUBCLASSES:

1. Foreman of highway construction—Grades II, III.
2. Laborer—Grades I, II.
3. Laborer, Fish and Game Commission—Grades I, II.
4. Section hand—Grades I, II.
5. Warden, Redwood Park Commission, Grades II, III.
6. Wharf sweeper—Grades I, II, III.

CLASS H. Legal Service.

Class H shall include all offices and places, the duties of which require a knowledge of law or legal work.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class H, is as follows:

Grade I. Shall include all positions, the duties of which require training and ability, but not necessarily much practical experience.
Range of compensation, $100.00–$175.00.

Grade II. Shall include all positions, the duties of which require recognized expert knowledge, training and experience.
Range of compensation, $175.00–$250.00.

SUBCLASSES:

1. Attorney—Grades I, II.
2. Decision writer, Industrial Accident Commission—Grades I, II.

CLASS I. Library Service.

Class I shall include all offices and places which deal with the administration of public libraries and require training and ability in library methods.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class I, is as follows:

Grade I. Shall include positions held by students in the Library School.
Range of compensation, 0–$50.00.

Grade II. Shall include positions, the duties of which require skill and accuracy and general training and involve responsibility.
Range of compensation, $50.00–$100.00.

Grade III. Shall include positions, the duties of which require the exercise of independent judgment in the performance of specialized or expert duties.
Range of compensation, $100.00–$150.00.

Grade IV. Shall include positions, the duties of which are supervisory, involving accountability for the work of others. Also positions, the duties of which require a higher order of specialized knowledge than in the case of Grade III positions, but not necessarily supervisory.
Range of compensation, $150.00–$200.00.

Grade V. Shall include positions, the duties of which are administrative, requiring special qualifications and recognized expert knowledge and involving the responsibility of the work of an entire division.

Range of compensation, $200.00 and above.

SUBCLASSES:

1. County library organizer—Grades III, IV.
2. Legislative reference librarian—Grades III, IV.
3. Library assistant—Grades I, II, III, IV, V.
4. School library organizer—Grades III, IV.

CLASS J. Medical Service.

Class J shall include all offices and places, the duties of which require training and ability in the medical profession, or in related professional work.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class J, is as follows:

Grade I. Shall include all positions, the duties of which require general training and education, but not necessarily much experience.

Range of compensation, $25.00–$50.00.

Grade II. Shall include all positions, the duties of which require skill, accuracy and experience and which involve fixed responsibility.

Range of compensation, $50.00–$75.00.

Grade III. Shall include all positions, the duties of which are substantially the same as Grade II, but of a higher order.

Range of compensation, $75.00–$100.00.

Grade IV. Shall include all positions, the duties of which require professional ability, involving fixed responsibility and the exercising of independent judgment, but not necessarily supervisory.

Range of compensation, $100.00–$150.00.

Grade V. Shall include all positions, the duties of which require professional ability and which involve the exercise of independent judgment and accountability for the work of others.

Range of compensation, $150.00–$200.00.

Grade VI. Shall include all positions, the duties of which are largely administrative, involving immediate responsibility for the medical work of an entire institution; also offices and places, the duties of which require a high order of specialized knowledge, and professional ability, and which may or may not be supervisory.

Range of compensation, $200.00–$350.00.

SUBCLASSES:

1. Clinical director, hospitals for the insane—Grades IV, V.
2. Dentist—Grades II, III, IV, V.
3. Director hygienic laboratory, Board of Health—Grades IV, V, VI.
4. Director bureau of tuberculosis, Board of Health—Grades V, VI.
5. Druggist—Grades III, IV.
6. Examining physician—Fees.
7. Homeopathic physician—Grades II, III, IV.
8. Medical director (assistant), Industrial Accident Commission—Grades III, IV, V.
9. Oculist—Grades II, III, IV.
10. Pathologist (medical)—Grades IV, V.
11. Physician—Grades I, II, III, IV, V, VI.

CLASS K. Nursing Service.

Division K shall include all offices and places, the duties of which involve the care of the sick or insane, and which require knowledge of the theory and practice of nursing.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class K, is as follows:

Grade I. Shall include all positions, the duties of which require training and skill and involve fixed responsibility, but which are not supervisory.
Range of compensation, $50.00–$60.00.

Grade II. Shall include all positions, the duties of which shall require skill and experience, and involve the exercise of independent judgment and accountability for the work of others.
Range of compensation, $60.00–$75.00.

Grade III. Shall include all positions, the duties of which are chiefly supervisory, requiring a high order of professional ability, and involving responsibiiity for the work of others.
Range of compensation, $75.00–$100.00.

Grade IV. Shall include all positions, the duties of which are similar to those of Grade III, but of a higher order.
Range of compensation, $100.00–$125.00.

SUBCLASSES:

1. Assistant to director, Bureau of Registration of Nurses, Board of Health—Grades III, IV.
2. Dietitian—Grades II, III.
3. Field worker, Bureau of Tuberculosis, Board of Health—Grades III, IV.
4. Hydrotherapist and masseur—Grades I, II, III.
5. Nurse (graduate)—Grades I, II, III, IV.
6. Nurse (surgical)—Grades I, II, III.

CLASS L. Clerical Service.

Class L shall include all offices and places, the duties of which are of a clerical nature, or service in connection with general office work or management which does not require knowledge of any of the specialties included in other classes.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class L, is as follows:

Grade I. Shall include all offices and places, the duties of which are of general routine.
Range of compensation, $25.00–$50.00.

Grade II. Shall include all offices and places, the duties of which require some skill and accuracy, but not necessarily much practical experience, involving simple office routine.
Range of compensation, $50.00–$75.00.

Grade III. Shall include all offices and places, the duties of which require skill and accuracy and some experience, involving routine work.
Range of compensation, $75.00–$100.00.

Grade IV. Shall include all offices and places, the duties of which require training, experience and ability, involving fixed responsibility, which may or may not be supervisory.
Range of compensation, $100.00–$125.00.

Grade V. Shall include all offices and places, the duties of which are supervisory, involving independent judgment and accountability for the work of others.
Range of compensation, $125.00–$150.00.

Grade VI. Shall include all offices and places, the duties of which are supervisory, requiring special knowledge and involving independent judgment and accountability for all the work of a clerical section or minor division of a department. Also positions, the duties of which require a high order of specialized knowledge, experience and ability, but not necessarily supervisory.
Range of compensation, $150.00–$175.00.

Grade VII. Shall include all offices and places, the duties of which are administrative, requiring special qualifications and involving responsibility for the clerical work of an entire department, under the direction of the head thereof, or for the work of a division or minor bureau of such department. Also positions, the duties of which are supervisory, requiring recognized expert knowledge and experience and ability.

Range of compensation, $175.00 and above.

SUBCLASSES:

1. Accountant—Grades IV, V, VI, VII.
2. Actuary—Grades VI, VII.
3. Adding machine operator—Grades II, III, IV.
4. Assistant deputy, State Printing Office—Grades IV, V, VI.
5. Assistant secretary, Board of Charities and Corrections—Grades IV, V, VI.
6. Assistant to secretary, Board of Health—Grades VI, VII.
7. Auditor, Board of Control—Grades V, VI, VII.
8. Auditor, Corporation Department—Grades V, VI, VII.
9. Bank examiner—Grades V, VI, VII.
10. Boat clerk, Harbor Commission—Grades III, IV.
11. Bookkeeper—Grades III, IV, V, VI.
12. Buyer of stationery and office supplies, Purchasing Department—Grades V, VI, VII.
13. Cashier—Grades V, VI, VII.
14. Clerk—Grades I, II, III, IV, V, VI, VII.
15. Clerk-stenographer—Grades IV, V, VI, VII.
16. Collector, Harbor Commission—Grades IV, V, VI.
17. Commissary and buyer, California School for Girls—Grades II, III, IV.
18. Compensation insurance clerk—Grades II, III, IV, V.
19. Compensation insurance stenographer—Grades II, III, IV, V.
20. Compensation insurance typist—Grades II, III.
21. Corporation tax expert—Grades V, VI.
22. Deputy clerk of the District Court of Appeals—Grades VI, VII.
23. Disability rating clerk, Industrial Accident Commission—Grades III, IV.
24. Examiner, Insurance Commission—Grades V, VI, VII.
25. Fabric buyer, Purchasing Department—Grades V, VI, VII.
26. Hollerith operator—Grades II, III, IV.
27. Housing expert, Immigration and Housing Commission—Grades IV, V, VI.
28. Inheritance tax clerk—Grades II, III, IV.
29. Interpreter, Immigration and Housing Commission—Grades II, III, IV, V.
30. Key punch operator—Grades II, III, IV.
31. Land tax expert—Grades V, VI.
32. Law clerk—Grades III, IV, V.
33. Manager, Employment Bureau—Grades IV, V, VI.
34. Messenger—Grades I, II.
35. Mining statistician—Grades V, VI, VII.
36. Multigraph operator—Grades II, III.
37. Office assistant—Grades I, II.
38. Office deputy, Mining Bureau—Grades III, IV, V.
39. Phonographic reporter—Grades VI, VII.
40. Property agent, Board of Control—Grades V, VI, VII.
41. Publicity agent, Bureau of Labor Statistics—Grades III, IV, V.
42. Publicity man—Grades VI, VII.
43. Purchasing agent for engineering equipment and construction materials, Purchasing Department—Grades VI, VII.
44. Quartermaster-commissary, Veterans' Home—Grades III, IV, V.
45. Right of way man—Grades IV, V, VI.
46. Shipping clerk and cameragraph operator, State Library—Grades III, IV, V.
47. Solicitor, Bureau of Labor Statistics—Grades III, IV, V.
48. Statistician—Grades V, VI, VII.

49. Stenographer—Grades II, III, IV, V.
50. Stockkeeper, State Printing Office—Grades III, IV, V.
51. Storekeeper, Harbor Commission—Grades III, IV.
52. Storekeeper, state hospitals—Grades II, III, IV.
53. Storekeeper and stock clerk, Purchasing Department—Grades IV, V, VI.
54. Superintendent of Employment Bureau—Grades V, VI, VII.
55. Superintendent of exhibits, State Fair—Grades VI, VII.
56. Telephone operator—Grades II, III.
57. Typist—Grades II, III, IV.
58. Underwriter, Compensation Insurance Fund, Industrial Accident Commission—Grades IV, V, VI, VII.
59. Wharfinger—Grades III, IV, V, VI.

CLASS M. Operating Engineering Service.

Class M shall include all offices and places, the duties of which require training and ability in the operation and maintenance of equipment for the production of heat, light or power, or in work relating thereto.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class M, is as follows:

Grade I. Shall include all positions, the duties of which involve the assisting in the care of a large plant or of equipment, but not responsibility for its operation. Also positions, the duties of which involve the charge of small plants.

Range of compensation, $60.00–$80.00.

Grade II. Shall include all positions, the duties of which are substantially the same as in Grade I, but of a higher order.

Range of compensation, $80.00–$100.00.

Grade III. Shall include all positions, the duties of which require complete responsibility for the operation of a plant or of equipment.

Range of compensation, $100.00–$125.00.

Grade IV. Shall include all positions, the duties of which are substantially the same as Grade III, but of a higher order.

Range of compensation, $125.00–$150.00.

SUBCLASSES:

1. Gas engineer—Grades I, II.
2. Gasoline launch engineer—Grades II, III.
3. Hoisting engineer—Grades III, IV.
4. Locomotive engineer—Grade III.
5. Locomotive fireman—Grades II, III.
6. Marine engineer (gas)—Grade III.
7. Marine engineer (steam)—Grades III, IV.
8. Marine fireman—Grade II.
9. Oiler—Grades I, II.
10. Stationary engineer—Grades I, II, III, IV.
11. Stationary fireman—Grades I, II, III.
12. Steam roller engineer—Grades III, IV.

CLASS N. Scientific Service.

Class N shall include all offices and places the duties of which require scientific knowledge and which are not included in any other class.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class N, is as follows:

Grade I. Shall include all positions, the duties of which require training and ability and involve fixed responsibility, but which are not supervisory.

Range of compensation, $50.00–$100.00.

Grade II. Shall include all positions, the duties of which require a high order of specialized knowledge, which may or may not involve accountability for the work of others.

Range of compensation, $100.00–$150.00.

Grade III. Shall include all positions, the duties of which are substantially as in Grade II, but of a higher order.

Range of compensation, $150.00–$200.00.

Grade IV. Shall include all positions, the duties of which are largely supervisory, involving accountability for the work of others and which require the highest degree of expert knowledge.

Range of compensation, $200.00 and above.

SUBCLASSES:

1. Bacteriologist—Grades I, II.
2. Chemist, Purchasing Department—Grades I, II.
3. Chemist and bacteriologist, Food and Drug Laboratory, Board of Health—Grades II, III.
4. Chemist and bacteriologist, Bureau of Sanitary Engineering, Board of Health—Grades II, III.
5. Dairy chemist—Grade II.
6. Determinative mineralogist—Grade III.
7. Educational director and psychologist—Grade IV.
8. Engineering chemist—Grade II.
9. Entomologist—Grades II, III.
10. Field assistant (forest)—Grade I.
11. Field assistant (mining)—Grades II, III.
12. Field deputy, Commission of Horticulture—Grade II.
13. Fish culturist—Grades I, II, III, IV.
14. Fishery expert—Grades II, III.
15. Food and drug chemist—Grades I, II, III, IV.
16. Game expert—Grades II, III.
17. Geologist—Grade IV.
18. Laboratory assistant, Mining Bureau—Grades I, II.
19. Laboratory assistant, Bureau of Sanitary Engineering, Board of Health—Grades I, II.
20. Laboratory helper, Bureau of Sanitary Engineering, Board of Health—Grade I.
21. Mineralogist—Grades I, II, III, IV.
22. Office assistant, Commission of Horticulture—Grades I, II.
23. Oil well driller—Grades III, IV.
24. Parasitological entomologist—Grades II, III.
25. Psychologist, reform schools—Grades I, II, III, IV.
26. Sanitary engineer (assistant), Bureau of Sanitary Engineering, Board of Health—Grade III.
27. Sanitary engineering assistant, Bureau of Sanitary Engineering, Board of Health—Grades I, II.
28. Screen and ladder surveyor—Grades I, II.
29. Testing engineer—Grades II, III, IV.
30. Veterinarian—Grades II, III, IV.
31. Veterinary pathologist—Grades II, III.

CLASS O. Skilled Labor Service.

Class O shall include all offices and places, the duties of which require training and ability in a trade, craft, or useful art, or which require special manual or mechanical skill, and which are not included in other classes.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class O, is as follows:

Grade I. Shall include all positions, the duties of which require ability in a trade, craft or useful art, but not necessarily involving the exercise of independent judgment.

Range of compensation (union scale).

Grade II. Shall include all positions, the duties of which require the exercise of independent judgment in the practice or pursuit of a trade, craft or useful art, requiring special manual or mechanical skill, and not regularly involving the supervision of work of more than one helper or assistant.

Range of compensation (union scale).

Grade III. Shall include all positions, the duties of which require special qualifications and involving responsibility for the work of one or more gangs or crews of skilled laborers.

Range of compensation (union scale).

SUBCLASSES:

1. Asbestos worker—Grades I, II, III.
2. Auto truck driver—Grade II.
3. Bindery worker (female)—Grades I, II, III.
4. Blacksmith—Grades I, II, III.
5. Boatman—Grades I, II.
6. Boilermaker—Grades I, II.
7. Bookbinder—Grades I, II, III.
8. Bricklayer—Grades I, II, III.
9. Cabinetmaker—Grades I, II.
10. Car repairer—Grades I, II.
11. Carpenter—Grades I, II, III.
12. Cement finisher—Grades I, II.
13. Chauffeur—Grade II.
14. Concrete worker—Grades I, II.
15. Coppersmith—Grades I, II.
16. Copyholder—Grade II.
17. Cylinder pressman—Grades I, II, III.
18. Deck hand—Grade II.
19. Dredger captain—Grades II. III.
20. Electrician—Grades I, II, III.
21. Elevator operator—Grade II.
22. Farm tractor operator—Grade II.
23. Foreman of highway construction—Grade III.
24. Foreman of tugs and dredgers—Grade III.
25. Gas fitter—Grades I, II.
26. Gasoline launch captain—Grade II.
27. General foreman, Harbor Commission—Grade III.
28. Handy man—Grade II.
29. Handy man, Sixth District Agricultural Association—Grade II.
30. Hod carrier—Grade I.
31. Ironworker—Grades I, II.
32. Lather—Grades I, II.
33. Linotype machinist—Grades I, II.
34. Linotype operator—Grades I, II.
35. Machinist—Grades I, II, III.
36. Mason (stone)—Grade II.
37. Mechanic—Grades I, II.
38. Mechanic, general (handy man)—Grade II.
39. Metal man, State Printing Office—Grade II.
40. Mill apprentice, Harbor Commission—Grade I.
41. Multicolor press operator—Grade II.
42. Painter—Grades I, II, III.

43. Paper hanger—Grade II.
44. Patcher—Grade II.
45. Paver—Grades II, III.
46. Photographer—Grade II.
47. Pile driver engineer—Grade II.
48. Pile man—Grades I, II.
49. Plasterer—Grades I, II, III.
50. Platen pressman—Grades I, II, III.
51. Plumber—Grades I, II, III.
52. Printer (floor)—Grades I, II, III.
53. Printing press machinist—Grades I, II.
54. Processor—Grades II, III.
55. Proofreader—Grades II, III.
56. Raftsman—Grades I, II.
57. Rammer—Grade II.
58. Repairer of office equipment—Grade II.
59. Roadmaster, Belt Railroad, Harbor Commission—Grade III.
60. Rock driller—Grade I.
61. Roundhouse man—Grades I, II.
62. Ruler—Grades I, II.
63. Sheet metal worker—Grades I, II.
64. Ship carpenter—Grade II.
65. Shoemaker—Grades I, II.
66. Shop assistant, Industrial Home for the Adult Blind—Grade I.
67. Shop superintendent, State Printing Office—Grade III.
68. Sign painter—Grade II.
69. Steam fitter—Grades I, II, III.
70. Switchman—Grades I, II, III.
71. Tailor—Grades I, II.
72. Tailor, Preston School of Industry—Grades I, II, III.
73. Teamster—Grade I.
74. Tile setter—Grades I, II.
75. Tinner—Grades I, II.
76. Tool keeper, Harbor Commission—Grade II.
77. Tugboat captain—Grade III.
78. Tugboat master—Grade III.
79. Warehouse foreman, State Printing Office—Grade II.

CLASS P. Teaching Service.

Class P shall include all offices and places, the duties of which involve mental, physical, or vocational training.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class P, is as follows:

Grade I. Shall include all positions, the duties of which require training, ability and fixed responsibility, but no accountability for the work of others.

Range of compensation, $50.00–$75.00.

Grade II. Shall include all positions, the duties of which require a high degree of specialized knowledge and which may or may not be supervisory.

Range of compensation, $75.00–$100.00.

Grade III. Shall include all positions, the duties of which are largely supervisory, involving responsibility for the work of others. Also positions that require a higher degree of specialized knowledge and ability than that required in Grade II.

Range of compensation, $100.00–$150.00.

Grade IV. Shall include all positions, the duties of which are largely administrative and advisory, involving responsibility for the educational work of an entire institution.

Range of compensation, $150.00 and above.

SUBCLASSES:

1. Catholic instructor, Preston School of Industry—Grade III.
2. Chaplain—Grade I.
3. Home and library teacher for the blind, State Library—Grades II, III.
4. Instructor of athletics—Grades I, II.
5. Instructor of baking—Grade II.
6. Instructor of band music—Grade II.
7. Instructor of barbering—Grade I.
8. Instructor of blacksmithing—Grade I.
9. Instructor of blind—Grades I, II, III.
10. Instructor of bookkeeping, School for Deaf and Blind—Grades I, II.
11. Instructor of broom making, School for Deaf and Blind—Grade I.
12. Instructor of cane seating for the blind—Grade I.
13. Instructor of cooking—Grade II.
14. Instructor of culinary art—Grade II.
15. Instructor of dairying and cheese making—Grade II.
16. Instructor of deaf—Grades I, II, III.
17. Instructor of dining room and pantry work—Grade I.
18. Instructor of domestic science—Grades I, II.
19. Instructor of farming—Grades II, III, IV.
20. Instructor of feeble-minded—Grades I, II.
21. Instructor of gardening—Grade II.
22. Instructor of grammar grades—Grade I.
23. Instructor of gymnasium, School for Deaf and Blind—Grades I, II.
24. Instructor of housekeeping—Grade I.
25. Instructor of the insane—Grades I, II.
26. Instructor of kindergarten—Grade I.
27. Instructor of laundering—Grades I, II.
28. Instructor of machine shop practice—Grade III.
29. Instructor of manual training—Grade III.
30. Instructor of manual training, School for Deaf and Blind—Grade III.
31. Instructor of military science—Grade I.
32. Instructor of music—Grades I, II.
33. Instructor of music, School for Deaf and Blind—Grades I, II.
34. Instructor of painting—Grades I, II.
35. Instructor of painting, School for Deaf and Blind—Grades I, II.
36. Instructor of pantry work—Grade I.
37. Instructor of physical culture—Grades I, II.
38. Instructor of plumbing—Grade II.
39. Instructor of presswork—Grade II.
40. Instructor of printing—Grade II.
41. Instructor of printing, School for Deaf and Blind—Grades II, III.
42. Instructor of recreation—Grade I.
43. Instructor of sewing—Grade I.
44. Instructor of shoemaking—Grades I, II.
45. Instructor of shoemaking, School for Deaf and Blind—Grades I, II.
46. Instructor of singing—Grades I, II.
47. Instructor of singing, School for Deaf and Blind—Grades I, II.
48. Instructor of sloyd work—Grade I.
49. Instructor of tailoring—Grade II.
50. Instructor of teaming—Grades I, II.
51. Instructor of truck gardening—Grade II.

CLASS Q. Warden Service.

Class Q shall include all offices and places, the duties of which involve the enforcement of state laws and regulations and include personal responsibility for the prevention of violations of the same.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class Q, is as follows:

Grade I. Shall include all positions, the duties of which involve fixed responsibilities for the enforcement of law in a definitely assigned district.
Range of compensation, $50.00–$100.00.

Grade II. Shall include all positions, the duties of which are largely supervisory, involving accountability for the work or conduct of others. Also positions, the duties of which require a high degree of skill or specialized knowledge.
Range of compensation, $100.00–$150.00.

Grade III. Shall include all positions, the duties of which are supervisory, involving responsibility for the conduct of an entire division.
Range of compensation, $150.00–$200.00.

Grade IV. Shall include all positions, the duties of which are largely administrative, involving the responsibility for the conduct of an entire department.
Range of compensation, $200.00 and above.

SUBCLASSES:

1. Deputy fish and game commissioner—Grades I, II.
2. Field agent, Fish and Game Commission—Grades III, IV.

CLASS R. Supervising Service.

Class R shall include all offices and places, the duties of which are chiefly supervisory, involving accountability for the maintenance of public property, or the work of public employees, but which do not require a knowledge of any of the specialties included in other classes.

The scope of each grade, as hereinafter used, in the grading of subclasses in Class R, is as follows:

Grade I. Shall include all positions, the duties of which are supervisory, involving the exercising of independent judgment, or the accountability for the work of large gangs or crews of men.
Range of compensation, $100.00–$150.00.

Grade II. Shall include all positions, the duties of which are chiefly administrative, involving responsibility for the operation of an important institution or division of work.
Range of compensation, $150.00–$200.00.

SUBCLASSES:

1. Assistant superintendent, California School for Girls—Grades I, II.
2. Assistant superintendent, Preston School of Industry—Grades I, II.
3. Business manager, state hospitals—Grades I, II.
4. Superintendent of highway construction—Grades I, II.
5. Superintendent of sand plant, Highway Commission—Grade II.

PART IV.

THE CIVIL SERVICE ACT

CHAPTER 590.

An act to provide for a general system, based upon investigation as to merit, efficiency and fitness, for appointment to and holding during good behavior of office and employment under state authority and, in that behalf, to create a state civil service commission, to prescribe its powers and duties, to make the wilful violation of the provisions of this act a misdemeanor, to repeal all acts and parts of acts inconsistent herewith in so far as they may be inconsistent with the provisions of this act, and to make an appropriation therefor. (*Approved June* 16, 1913.)

The people of the State of California do enact as follows:

SECTION 1. *First*—The term "commission" as used in this act means the "state civil service commission" herein created, and the term "commissioner" as used in this act means one of the three members of that commission, all unless such terms are plainly used with some other meaning.

Second—The terms "position" and "positions" as used in this act include all offices and employments under state authority, whether there be any salary or other compensation or emolument connected therewith, except offices held by elective officers as such and also except the militia and all offices and employments as now or hereafter provided by virtue of or under article VIII of the constitution of the state, and except county and township offices and employments.

Third—The term "appointing power" as used in this act includes all persons whether acting singly or in conjunction with others in any way whatsoever, either by nomination or confirmation or as a board or commission or otherwise, in selecting any one to hold any position as that term is so used in this act.

Fourth—The term "appointment" as used in this act includes all means of selecting and employing any one to hold any position as that term is so used in this act.

SEC. 2. There is hereby created a commission known as the "state civil service commission" which shall consist of three commissioners but which may continue to act after being fully constituted if there is not more than one vacancy in such commission. The commission shall be first constituted by three commissioners appointed for terms ending July 1, 1914, July 1, 1916, and July 1, 1917, respectively, and the succeeding terms shall each be for a period of four years. The governor shall appoint all commissioners including those who fill unexpired terms. Any commissioner may be removed by concurrent resolution of both houses of the legislature adopted by a two thirds vote of each house. The commissioners shall each receive a salary of three thousand dollars per annum, which shall be paid at the same time and in the same manner as the salaries of state officers are paid, and the commissioners shall also be paid necessary traveling expenses incurred in the performance of their duties. The total and items of all expenditures and obligations made, authorized and incurred by the commission shall not exceed the sums appropriated therefor by law.

SEC. 3. The commission shall employ a chief examiner and secretary, which offices may be combined, and such other employees as it may deem necessary or proper to carry out the purposes of this act. Their compensation shall be fixed by the commission, and they may be paid necessary traveling expenses incurred in the discharge of their duties. The duties of the chief examiner, secretary and other employees shall be prescribed by the commission, subject to the provisions of this act. It shall be the duty of the secretary to keep the minutes of the meetings of the commission and perform such other services as may be assigned him by the commission. The commission may select suitable persons to assist in examinations under its direction. The compensation of such assistants shall not exceed five dollars per day, except in the case of special and expert examiners employed in the preparation of questions and rating of candidates; and when the persons so selected are in the official service of the state it shall be deemed a part of their official duty to serve as such assistants without additional compensation.

SEC. 4. The commission is authorized to secure in the city of Sacramento suitable and convenient rooms and accommodations and cause the same to be furnished, heated and lighted, for carrying on the work of the commission and the commission may order the necessary stationery, postage stamps, and official seal and other articles to be supplied, and the necessary printing to be done for its official use.

SEC. 5. The commission shall:

First—Classify positions to be held under state authority in accordance with the provisions of this act and in accordance with the duties attached to such positions. The commission shall grade all positions within each class with respect to salaries, to the end that like salaries shall be paid for like duties. Such classes and grades may from time to time be amended, added to, consolidated or abolished by the commission, but persons holding positions under the original classification or grade shall not be affected thereby.

Second—Hold examinations to determine the merit, efficiency and fitness of applicants for positions, and prepare properly classified eligible lists from applicants so examined. All questions for examination shall be prepared under the supervision of the commission or chief examiner and delivered to the examining board or to the candidates by one of the commissioners or chief examiner or by an examiner specially designated to perform such service.

Third—Enforce the provisions of this act and prescribe, and enforce suitable rules and regulations for carrying the same into effect and from time to time amend and repeal the same.

Fourth—Keep minutes of its own proceedings, and records of its examinations and other official actions.

Fifth—Records of individual efficiency of holders of positions in performing their duties shall be established in all offices and places of employment affected by this act. Such records shall be made by the appointing power, unless otherwise directed by the commission, and under and in accordance with such rules and regulations as the commission may prescribe, and a copy of such records shall be filed with the commission. The commission shall investigate all such efficiency records and may make its own records, and shall rate upon such records the item of "ascertained merit" in examinations for promotion. The commission shall establish and enforce rules and regulations under which records of unsatisfactory service may lead to reduction in grade and compensation of the person holding the position concerned, and shall further provide for the manner in which persons falling below the standards of efficiency fixed by its rules and regulations may be removed from their positions by the commission proceeding substantially as provided in this act and with the same effect as in case of removals by the appointing power.

Sixth—Make investigations concerning and report upon all matters touching the enforcement and effect of the provisions of this act and the rules and regulations prescribed thereunder; inspect all state institutions, offices, places of employment and services affected by this act, and ascertain whether this act and all such rules and regulations are obeyed. Such investigation may be made by any commissioner, or chief examiner, or by any other authorized agent of the commission. In the course of such investigation any commissioner, or chief examiner or such other authorized agent of the commission, or the secretary of the commission, shall have power to administer oaths, subpœna and require the attendance in this state of witnesses and the production thereby of books, papers, documents and accounts appertaining to the investigation but not requiring the attendance of witnesses either with or without books, papers, documents or accounts unless residing within the same county or within thirty miles of the place of attendance.

Seventh—All hearings and investigations before the commission, or any commissioner, or the chief examiner or such other authorized agent of the commission shall be governed by this act and by rules of practice and procedure to be adopted by the commission, and in the conduct thereof neither the commission, nor any commissioner, nor the chief examiner nor such other authorized agent of the commission shall be bound by the technical rules of evidence. No informality in any proceeding or in the manner of taking testimony before the commission or any commissioner, or the chief examiner or such other authorized agent of the commission shall invalidate any order, decision, rule or regulation made, approved or confirmed by the commission. The superior court in and for the county, or city and county, in which any inquiry, investigation, hearing or proceeding may be held by the commission, or any commissioner, or the chief examiner or such other authorized agent of the commission shall have the power to compel the attendance of witnesses, the giving of testimony and the production of books, papers, documents and accounts, as required by any subpœna issued by the commission, or any commissioner, or such other authorized agent of the commission or the secretary. The commission, or the commissioner, or the chief examiner or such other authorized agent of the commission before whom the testimony is to be given or produced, in case of the refusal of any witness to attend or testify or produce any papers required by such subpœna, may report to the superior court in and for the county, or city and county, in which the proceeding is pending, by petition, setting forth that due notice has been given of the time and place of attendance of said witness, or the production of such books, papers, documents or accounts, and that the witness has been summoned in the manner prescribed in this act, and that the witness has failed and refused to attend or produce such books or papers or documents or accounts required by the subpœna, before the commission, or the commissioner, or the chief examiner, or such other authorized agent of the commission, in the matter named in the notice and subpœna, or has refused to answer questions propounded to him in the course of such proceeding, and ask an order of said court, compelling the witness to attend and testify or produce such books or papers or documents or accounts before the commission, or any commissioner, or the chief examiner or such other authorized agent of the commission. The court, upon the petition of the commission, or any commissioner, or the chief examiner or such other authorized agent of the commission, shall enter an order directing the witness to appear before the court at a time and place to be fixed by the court in such order, the time to be not more than ten days from the date of the order, and then and there show cause why he has not attended and testified or produced said papers before the commission, or such commissioner, or the chief examiner or such other authorized agent of the commission. A copy of said order shall be served upon said witness. If it shall appear to the court that said subpœna was regularly issued by the commission, or any commissioner, or the chief examiner or other authorized agent of the commission or the secretary, the court shall thereupon enter an order that said witness appear before the commission, or such commissioner, or the chief examiner or any other authorized agent of the commission at the time and place fixed in said order, and testify or produce the required books, papers, documents and accounts, and upon failure to obey said order, said witness shall be dealt with as for contempt of court. The remedy provided in this section is cumulative, and shall not be construed to impair or interefere with the power of the commission, or a commissioner, or the chief examiner or any such other authorized agent of the commission to enforce the attendance of witnesses and the production of books, papers, documents and accounts.

The commission, or any commissioner, or the chief examiner or such other authorized agent of the commission may, in any investigation or hearing before the commission, or any commissioner, or the chief examiner or such other authorized agent of the commission, cause the deposition of witnesses residing within or without the state to be taken in the manner prescribed by law for like depositions in civil actions in the superior courts of this state and to that end may compel the attendance of witnesses and the production of books, papers, documents and accounts.

No person shall be excused from testifying or from producing any book, paper, document or account in any investigation or inquiry by or hearing before the commission, or any commissioner, or the chief examiner or such other authorized agent of the commission, when ordered to do so, upon the ground that the testimony or evidence, book, paper, document or account required of him may tend to incriminate him or subject him to penalty or forfeiture, but no person shall be prosecuted, punished or subjected to any penalty or forfeiture for or on account of any act, transaction, matter or thing concerning which he shall, under oath, have testified or produced documentary evidence; *provided*, that no person so testifying shall be exempt from prosecution or punishment for any perjury committed by him in his testimony. Nothing herein contained shall be construed as in any manner giving to any person immunity of any kind otherwise than is herein expressly provided.

Eighth—Make a biennial report to the governor for transmission to the legislature, showing the action of the commission including all the rules and regulations adopted by it during such period and those that are in force at the time of making such report, information as to exempted positions as required by this act and the effects of this act and of all proceedings under it and any suggestions the commission or any commissioner may deem practical for the more effectual accomplishment of the purposes of this act.

Ninth—Meet at Sacramento as often as the needs of the public service may require, and at such other places as the commission may designate. A majority of the members of the commission shall constitute a quorum.

SEC. 6. It shall be the duty of all persons subject to the authority of the state in that behalf (including all state officers and employees and all state institutions of every kind and character) to aid in all proper ways in carrying into effect the provisions of this act and the rules and regulations prescribed from time to time thereunder and especially, at the request of the commission, to allow the commission the reasonable use of public buildings and to heat and light the same for the purposes of making examinations of applicants and investigations as provided by this act. Every one subject to the authority of the state in that behalf shall afford to the commission and its members and employees all reasonable facilities and give inspection of all books, papers, documents and accounts applying or in any way appertaining to any and all offices subject to the authority of the state in that behalf, and shall also produce said books, papers, documents and accounts, and shall attend and testify when required to do so by the commission, or any commissioner, or the chief examiner, or the secretary or any other authorized agent of the commission. The attorney general shall advise and assist the commission, and the district attorneys of the counties shall prosecute violations of this act. The commission may employ special counsel.

SEC. 7. The appointing power in all cases not excepted or exempted under the provisions of this act, or by virtue of the provisions of the constitution of the state, shall fill positions by appointment, including cases of transfers, reinstatements, promotions and reductions, in strict accordance with the provisions of this act and the rules and regulations prescribed from time to time hereunder, and not otherwise. Except only and to the extent that the appointing power otherwise requests as hereinafter provided, the positions held in the following specified classes are excepted from such method of appointment:

First—Appointees of the legislature and one person holding a position having a confidential relation whether as secretary or clerk or stenographer to an elective officer.

Second—Appointees of the governor and one person holding a position having a confidential relation whether as secretary or clerk or stenographer to each such appointee.

Third—The chief deputy of and also one person holding a position having a a confidential relation whether as secretary or clerk or stenographer to an elective officer.

Fourth—The secretary or executive officer, or both, and also the attorney and one stenographer of any board or commission appointed by the legislature or governor or elected by the electors, and all stenographers in the superior and appellate courts.

Fifth—The assistant and deputies of the attorney general and all special attorneys for boards and officers.

Sixth—The members of the appointing board of and any chief in any legislative reference or counsel bureau and one person holding a confidential relation to each such chief.

Seventh—One warden for each of the state prisons.

Eighth—One superintendent for each of the state reformatories, state hospitals or other state charitable or correctional institutions; also the parole officers for the state prisons, Preston School of Industry and Whittier State School.

Ninth—Persons employed by the University of California and the state normal schools, and the teaching force of the elementary, secondary, trades and technical schools.

Tenth—Persons engaged in work done by cooperation between the state and federal governments.

Eleventh—The state librarian, the chief deputy or assistant state librarian and also one person holding a position having a confidential relation to the state librarian, and appointees under provisions for court, law, teachers, school and county libraries.

Twelfth—The secretary, chief accountant and children's agents of the state board of control.

Thirteenth—The employees of the state railroad commission.

Fourteenth—Superintendents, chiefs, and heads of departments.

All provided that at any time any vacancy in any position in any of the above specified fourteen excepted classes may be filled by the appointing power in the manner provided by this act, in which case the person appointed shall hold, during the tenure of office of said appointing power, such position under the tenure of good behavior and subject to the provisions of this act as if that position had not been so excepted but upon such appointee ceasing to hold such position that position shall be open as in such excepted class. Upon such appointee ceasing to hold such office by reason of the termination of the tenure of office of said appointing power, said appointee shall be restored to place upon the eligible lists in accordance with such rules and regulations as the commission may prescribe in that behalf. Any position subject to the provisions of this act may be declared exempted by resolution passed by concurrence of the three commissioners. Such resolution shall state separately the reasons for each exemption. Not more than one appointment shall be made to or under any position covered by such resolution unless permission to appoint a different number is given therein. Any exception thus made may be terminated at any time by resolution of the commission. Appointments to exempted positions shall be reported immediately to the commission. The names of each exempted position and the names of the incumbent and the reason for each exemption shall be stated in the biennial reports of the commission.

Sec. 8. Within three months after the commission is constituted, it shall make rules for the classification of positions to be held under state authority to be provided by this act, and, subject to the provisions of this act, such rules shall govern appointments, transfers, reinstatements, promotions, reductions and removals, and examination of applicants, and the commission may amend such rules from time to time. Such rules shall be printed for public distribution.

Sec. 9. Subject to the special provisions in this act as to laborers, appointments shall be made to all positions that are not filled by promotion, reinstatement, transfer or reduction, under the provisions of this act and the rules in pursuance thereof, by the appointing power: Said appointing power shall notify the commission of any vacancy to be filled, stating the duties of the position. The commission shall then certify to the appointing power the names and addresses of the three persons standing highest on the eligible list for the class or grade to which the position belongs; but in case there be less than three on such eligible list, the commission shall certify the number thereon; and the appointing power shall fill the position by the appointment of one of the persons certified by the commission therefor. The term of eligibility shall be fixed for each eligible list at not less than one year. Appointments shall be made from the eligible list most nearly appropriate for the position to be filled, and a new list shall be created for a stated position or a group of positions only when there is no appropriate list existing from which appointment may be made. No person shall be appointed under any title not appropriate to the duties to be performed, and no person shall be assigned to perform the duties of any other position than that which he legally holds, except by consent of the commission. All appointments shall be for a probationary period to be fixed by the commission but not to exceed six months. Unless such appointee shall have been dismissed within such probationary period by the appointing power, for reasons stated in writing and filed with the commission, his appointment shall become permanent subject to the provisions of this act as to removals, suspensions and changes. Discharged probationers may by unanimous vote of the commission be restored to the list of eligibles for certification to any position within their class other than the one from which they were rejected.

Sec. 10. The examinations shall be practical in their character, and shall relate to those matters which will fairly test the relative capacity and fitness of the persons examined to discharge the duties of the positions they seek. Applicants for positions in the mechanical trades and occupations may, in the discretion of the commission, be rated solely on experience and physical qualifications which may be determined by such evidence and in such manner as the commission may direct; and such applicants may be submitted to such further tests as the commission may require. The commission shall prepare lists of preliminary requirements and subjects of examinations for the several positions, and shall publish its rules and regulations and such information and advertise such examinations in such manner as the nature of the examination may require. The commission, except as may be otherwise provided in the case of laborers, shall require an applicant to file in its office, in accordance with its rules and regulations, a reasonable length of time before the date of examination, a formal application filled out in his own handwriting. Blank forms of such applications shall be furnished by said commission without charge to all persons requesting the same. The commission may require in connection with applications, including laborers, such certificates of citizens, physicians, public officers or others having knowledge of the applicant, as the good of the service may require. The commission may refuse to examine, or after examination to certify as eligible, anyone who is found to lack any of the established preliminary requirements for the examination or position for which he applies; or who is physically so disabled as to be rendered unfit to perform the duties of the position to which he seeks appointment, or who is addicted to the habitual use of intoxicating beverages to excess; or who has been guilty of a crime or of infamous or notoriously disgraceful conduct; or who has been dismissed from the public service for delinquency or misconduct; or who has intentionally made a false statement of any material facts, or practiced, or attempted to practice, any deception or fraud in his application, in his examination, or in securing his eligibility. Any person appointed to a position under the provisions of this act who has secured his place on the eligible list through fraud shall be removed by the commission from his position and shall not thereafter be eligible for examination for any position under the provisions of this act except by unanimous permission of the commission. When the position to be filled involves fiduciary responsibility, the appointing power may require the appointee to furnish a reasonable bond or other security, and shall notify the commission of the amount and necessary details thereof.

Sec. 11. When there is no eligible list from which a position may be filled, the appointing power may, with the consent of the commission, fill such position by temporary appointment, and such temporary appointment shall not continue for a longer period than three months, nor shall successive temporary appointments be made to the same position under this section without the previous consent of the commission, and in no case shall any person hold a position under such successive temporary appointments for a longer period than six months without the unanimous consent of the commission.

SEC. 12. The commission shall establish rules and regulations under which emergency appointments may be made when those on the eligible lists are not immediately available, and for the time for which such emergency appointments shall be valid; and may fix a different time for different counties or cities and counties of the state.

SEC. 13. Vacancies in positions shall be filled, so far as practicable by promotion from among persons holding positions in a lower grade of the department, office or institution in which the vacancy exists. Promotions shall be based upon merit and competition and upon the superior qualifications of the person promoted as shown by his records of efficiency. For the purposes of this section an increase in the salary or other compensation of any person holding an office or position within the scope of the rules and regulations in force hereunder beyond the limit fixed for the grade in which such office and position is classified, shall be deemed a promotion. The commission may authorize the transfer of any person legally holding a position to a similar position in the same class or grade, and may provide for the reinstatement within one year of persons separated from positions without fault or delinquency on their part, if within that time there is need for their services. No promotion, transfer or reinstatement shall be made from a position in one class to a position in another class, nor shall a person be transferred to or reinstated in a position for original entrance to which there is required by this act or the rules and regulations thereunder an examination involving essential tests or qualifications different from or higher than those required for original entrance to the position held by such person.

SEC. 14. The tenure of every one holding a position under the provisions of this act shall be during good behavior, but any such person may be removed for any of the following causes:

(*a*) Incompetence or inefficiency.

(*b*) Dishonesty, intemperance, immoral conduct, insubordination, discourteous treatment of the public or of fellow employees, a violation of the provisions of this act or of the rules or regulations of the commission or any other failure of good behavior. The appointing power that could fill such positions under the provisions of this act if vacant or the commission may remove, as hereinafter provided, for such cause. The appointing power in so proceeding must furnish to the person holding such position written charges setting forth such ground for removal and file copy with the commission and allow the accused a reasonable time and opportunity to file with the commission and furnish to said appointing power written answer and explanation and thereafter said appointing power shall publicly hear and determine such charges after reasonable notice to the accused and the commission of the time and place of said hearing and affording the accused an opportunity at such hearing to present whatever competent evidence the accused may desire in defense. In case of charges presented by or to the commission, it shall proceed in like manner. A judgment of removal, in writing, setting forth the findings of said appointing power after such hearing and filed with the commission, shall be final and effect such removal and shall not be subject to review by any other tribunal, except that in case of proceedings against the same person before both the appointing power and the commission the judgment against the accused by either the appointing power or the commission shall control a judgment by the other in favor of the accused. Such appointing power may from time to time peremptorily suspend, with loss of salary or other compensation during such suspension, such person for such cause, and without trial, but only upon written charges so furnished to such person and filed with the commission and with the privilege to such person to so furnish to the appointing power and file with the commission written answer and explanation, but such suspension or total suspensions by that appointing power of that person shall not exceed thirty days. Either the appointing power or the commission may transfer charges to the other for action or investigation.

Sec. 15. The commission shall provide by rule for the employment of laborers in the labor class in the order of priority of application for employment. There shall be separate lists of applicants for different kinds of labor, and the commission may provide separate labor registration lists for departments, institutions, districts or localities. The commission may require an applicant for registration to pass such examination as they may deem proper with respect to his age, residence, physical condition, ability to labor, skill, capacity and experience. The commission shall establish such time as it may deem expedient for the duration of eligible lists in the labor class.

Sec. 16. It shall be the duty of each appointing power to report to the commission forthwith upon each appointment the name of the appointee, the title or character of the position, the date of the commencement of such service, and the salary or compensation therefor, and to report from time to time, and upon the date of official action in, or knowledge of each case, any separation of the person from the position, or other changes, and such other information as the commission may require in order to keep the roster hereinafter mentioned. The commission shall keep in its office an official roster of all persons holding positions under the provisions of this act and shall enter thereon the name of each and every person who has been appointed to, promoted, reduced, transferred, reinstated or removed from or left any position and require such evidence as it may deem satisfactory as to whether such person was appointed to, promoted, reduced, transferred, reinstated or removed from such position in accordance with the provisions of this act and the rules and regulations of the commission thereunder and as to when and why and how such person was otherwise separated from such position. The official roster shall show opposite, or in connection with, each name, the date of appointment, promotion, reduction, transfer or reinstatement, the compensation of the position, the date of commencement of service and change in or separation from position and when and why and how there was such change or separation. The names of all persons holding positions at the time of the taking effect of this act which if vacant would be filled under the provisions of this act shall be certified to the commission by the appointing power that could then so fill such position if vacant, and such names shall be entered in said roster, and thereupon shall be deemed appointed under the provisions of this act and persons then holding such positions who have served in such positions a less period than one year and more than sixty days from the date of the classification of such positions as required by this act shall be deemed to be serving the probationary period, and persons who have served in such positions for less than such sixty days shall be deemed temporary appointees.

Sec. 17. It shall be unlawful for the controller or other fiscal officer of the state to draw, sign, issue, or authorize the drawing, signing, or issuing of any warrant on the treasurer or other disbursing officer of the state for the payment of, or for the treasurer or other disbursing officer to pay any salary or compensation to any one holding any position under the provisions of this act unless the estimate, pay roll or account for such salary or compensation, containing the name of the person to be paid, shall bear the certificate of the commission that the persons named in such estimate, pay roll or account are holding positions as provided by this act and the rules and regulations prescribed thereunder. Any sums paid contrary to the provisions of this section may be recovered from any one making such appointment in violation of the provisions of this act and of the rules and regulations prescribed thereunder or from any officer signing, or countersigning, or authorizing the signing or countersigning of any warrant for the payment of the same, and from the sureties on his official bond in an action in any court of competent jurisdiction of this state maintained by a citizen resident therein, who is assessed for and is liable to pay, or within one year before the commencement of such action has paid, a tax therein. All moneys recovered in any action brought under the provisions of this section must, when collected, be paid into the treasury of the state, except that the plaintiff in any such action shall be entitled to receive for his own use the taxable costs of such action.

SEC. 18. Any commissioner or examiner, or any person who shall wilfully by himself or in co-operation with one or more persons, defeat, deceive or obstruct any person in respect of his or her right of examination or registration, according to any rules or regulations prescribed pursuant to the provisions of this act, or who shall wilfully and falsely mark, grade, estimate, or report upon the examination or proper standing of any person examined, registered, or certified, pursuant to the provisions of this act, or aid in so doing, or who shall wilfully make any false representation concerning the same, or concerning the person examined, or who shall wilfully furnish to any person any special or secret information for the purpose of either improving or injuring the prospects or chances of any person so examined, registered, or certified, or to be examined, registered, or certified, or who shall personate any other person, or permit or aid in any manner any other person to personate him, in connection with any examination or registration or application or request to be examined or registered, shall be deemed guilty of misdemeanor.

SEC. 19. No officer, agent, clerk or employee under the government of the state shall, directly or indirectly, solicit or receive, or be in any manner concerned in soliciting or receiving, any assessment, subscription, contribution or political service, whether voluntary or involuntary, for any political purpose whatever, from any one on the eligible lists or holding any position under the provisions of this act.

Every officer, agent, clerk or employee under the government of the state who may have charge or control in any building, office, or room occupied for any purpose of said government is hereby authorized to prohibit the entry of any person, and he shall not permit any person to enter the same, for the purpose of therein making, collecting, receiving or giving notice of any political assessment, subscription or contribution, and no person shall enter, or remain in any said building, office or room, or send or direct any letter or other notice thereto, for the purpose of giving notice of, demanding, or collecting a political assessment, subscription or contribution, nor shall any person therein give notice of, demand, collect or receive, any such assessment, subscription or contribution contrary to the provisions of this section.

SEC. 20. No one, while holding any public office, or in nomination for, or while seeking a nomination or appointment for, any public office, shall use or promise to use, whether directly or indirectly, any official authority or influence (whether then possessed or merely anticipated) in the way of conferring upon any person, or in order to secure or aid any person in securing any position under the provisions of this act, either in nomination, confirmation, promotion, or increase in salary, or as to any change in any such position, upon a consideration or condition that the vote or political influence or action of the last named person or any other, shall be given or used in behalf of any candidate, officer or party, or upon any other corrupt condition or consideration. And no one, being a public officer, or in nomination for, or while seeking nomination or appointment for, any public office or having or claiming to have any authority or influence (whether then possessed or merely anticipated) for the securing or holding of or as to affecting any position under the provisions of this act, shall use, or promise or threaten to use, any such authority on influence, directly or indirectly, in order to coerce or persuade the vote or political action of any person on the eligible lists or holding any position under the provisions of this act.

SEC. 21. No salary, compensation or other emolument shall be paid to any one appointed to or retained in any position in violation of this act. Any officer approving or paying such salary shall be liable for such sum on his official bond. Whenever the commission shall notify the auditing officer that any position has been filled in violation of this act or any of the rules and regulations thereunder, no demand for the salary or compensation or other emolument of such position shall be approved or paid except upon the order of a court of competent jurisdiction.

SEC. 22. Any person acting in good faith in accepting appointment or employment contrary to the provisions of this act or of the rules and regulations prescribed thereunder, shall be paid by the appointing power the compensation promised by or on behalf of the appointing power or in case no compensation is so promised then the actual value of any service rendered and the expense incurred in good faith under such attempted appointment or employment, and shall have a cause of action against the appointing power for such sum or sums and for the costs of action. No public officer shall be reimbursed by the state or any of its instrumentalities for any sum so paid or recovered in such action.

SEC. 23. No recommendation or question or inquiry under the authority of this act shall relate to the political or religious opinions or affiliations of any person, and no appointment or change in or removal from any position under the provisions of this act shall be in any manner affected or influenced by such opinions or affiliations.

SEC. 24. Witnesses and officers to subpœna and secure the attendance of witnesses before the commission, or any commissioner, or the chief examiner or other authorized agent of the commission, shall be entitled to the same fees as are allowed witnesses in civil cases in courts of record. Such fees need not be prepaid, but the controller shall draw his warrant for the payment of the amount thereof when the same shall have been certified to by the commission and duly proved by affidavit or otherwise to the satisfaction of the controller.

SEC. 25. Any person wilfully violating any of the provisions of this act shall be guilty of a misdemeanor.

SEC. 26. All acts and parts of acts inconsistent with this act are hereby repealed in so far as they are inconsistent with the provisions of this act.

SEC. 27. There is hereby appropriated the sum of fifty thousand dollars for carrying into effect the provisions of this act, and for defraying the expenses of the commission during the biennial term of 1913–1914.

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REPORT

OF THE

STATE TAX COMMISSION

OF THE

STATE OF CALIFORNIA

1917

California State Printing Office
Sacramento.
1917

27102

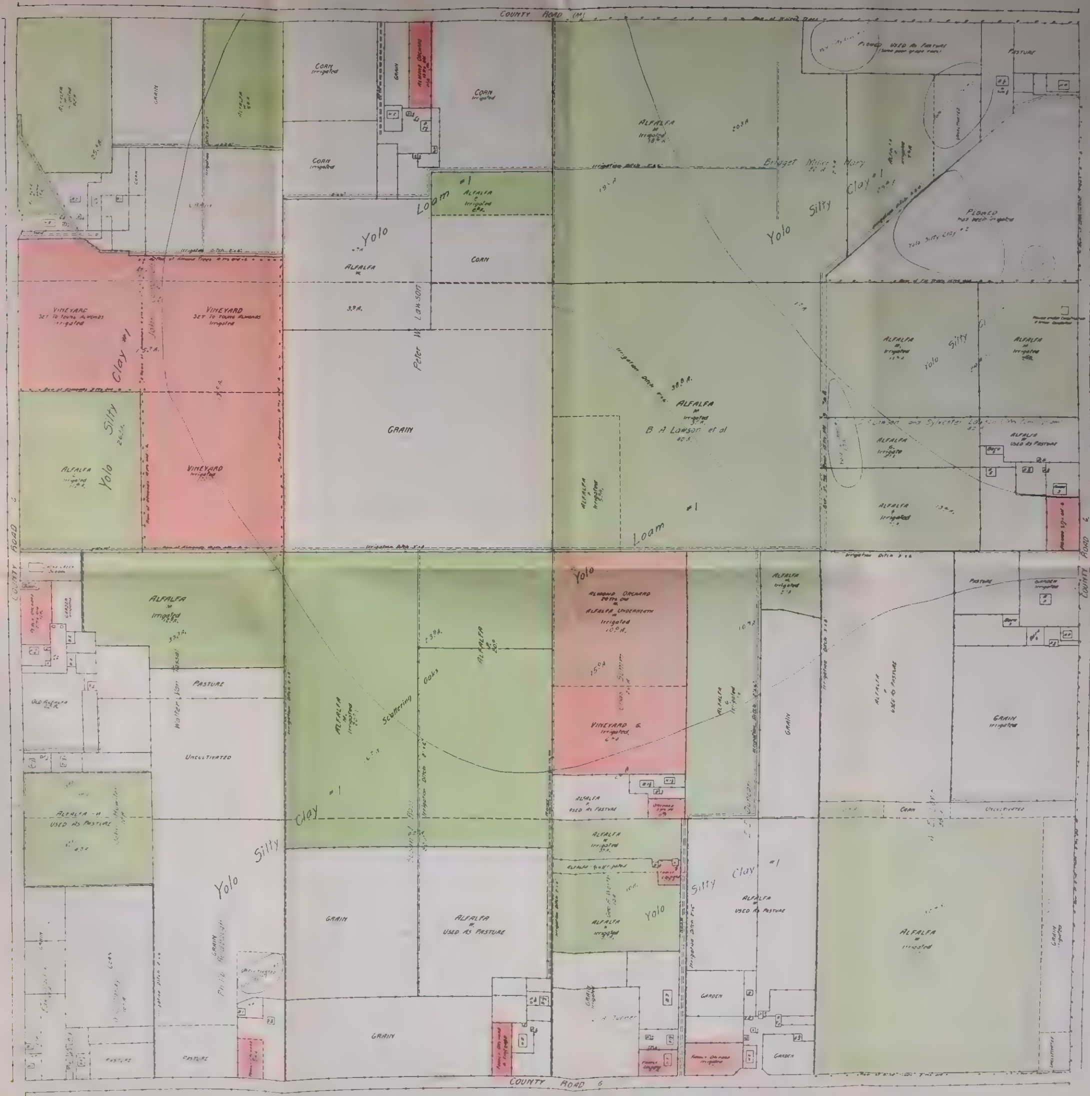
STATE TAX COMMISSION

Clyde L. Seavey, *Chairman*

E. A. Dickson

Lee C. Gates

Wm. V. Cowan, *Secretary*



MAP SHOWING RECORD OF CLASSIFIED SURVEY FOR VALUATION PURPOSES (Section 25, T. 10 N., R. 1 E., M. D. M.)

This map is given merely as an illustration of text on page 76 of this report. Color schemes and other designation can be used to suit individual preference. In the above map, figures under crop designation indicate amount of acreage of that particular crop; figures under names of persons indicate amount of acreage owned; under soil characterization the amount of such soil, and standing alone the acreage in the field. Fields of alfalfa are shown in green; of orchard and vineyard in pink; grain, corn, etc., in white; soil boundary lines, soil names, etc., in blue; H., B. and S. mean house, barn and shed respectively; the figures 2, ¼, etc. mean $200, $25, etc., $100 being taken as a unit of value. G. after alfalfa, orchard, road, etc., means good; M. medium; P. poor; W. worthless. Fences are shown thus ——•——• --•-- -, irrigation ditches - - - - .

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LETTER OF TRANSMITTAL.

To His Excellency,
HIRAM W. JOHNSON,
Governor of California.

SIR:

In accordance with an act of the legislature (chapter 194, statutes of 1915), authorizing an investigation of the general subject of taxation, there were appointed by you as members of the commission to make the investigation, Clyde L. Seavey, E. A. Dickson and Lee C. Gates. A report to the legislature, as called for in the act, is herewith submitted.

In this work we have received generous cooperation from federal, county and municipal officers, and from many civic organizations and individuals interested in the problem of taxation.

Respectfully submitted,
STATE TAX COMMISSION.

Sacramento, California,
January, 1917.

REPORT ON REVENUE AND TAXATION

BY THE

STATE TAX COMMISSION.

To the Senate and Assembly of the Forty-second Session of the California Legislature.

GENTLEMEN:

An investigation covering a period of a year and four months has been carried on by this commission, comprehending the following salient features provided for in an act passed by the forty-first session of your body:

(*a*) Report upon all matters covering the subject of revenue and taxation in this state.

(*b*) Report upon the burden borne by general property and corporation property.

(*c*) Report upon losses of revenue sustained by counties, caused by the withdrawal of railroad property from local taxation.

Need of economy and sound fiscal policy.

The general subject of taxation has been approached by this commission with a feeling and belief that the people of California desire the following results:

First—Economy and strict accountability in the raising of revenue and in its expenditure.

Second—Not new methods of raising more taxes, but equitable methods of assessing and raising the necessary revenue—so that all will pay for the benefits received according to their ability.

Third—The uncovering of sources of revenue that are now untaxed, and the apportionment of those revenues so that present taxes may be reduced and equalized.

Fourth—A fundamentally sound and permanent system of taxation, so that investments in California of all kinds will be inviting and may be made with a feeling of security.

Fifth—A revenue system that will protect the counties and cities in their inherent right to receive a proper measure of tax from the property having its situs in the community where said property derives benefits.

Acting in accordance with these fundamental considerations, this commission makes certain recommendations covering the general subject, which may be classified under two heads: first, those things that may be accomplished by statutory provision and administration; and, second, those things that can only be accomplished by constitutional change. These recommendations are presented elsewhere in this report.

HISTORY OF STATE TAXATION.

During the past six years California has made remarkable advance in all branches of government, so that today it leads all American commonwealths in efficient and economic administration. Only in the matter of taxation is there an exception to this governmental advance.

The reason for the failure to keep pace in taxation has been due to the necessity of giving Constitutional Amendment No. 1 a fair trial before proceeding materially to modify its provisions.

From the beginning of the state government up to 1905, practically no change was made or attempted in the system of taxation which was in existence and commonly known as the general property tax. But at the session of 1905 provision was made for the investigation of the tax system of this state, and a commission was provided for and continued in existence until the end of the year 1910—a period of six years.

That commission presented an amendment to the constitution, familiarly known as Amendment No. 1, which was finally adopted at the general election in November, 1910.

Essential features of Amendment No. 1.

The amendment adopted accomplished one specific thing—the separation of state and local revenue. Under this the property of certain public service corporations was exempted from local taxation, and a tax for state purposes placed upon the gross receipts of such corporations. The capital stock of banks was also exempted from local taxation and a tax for state revenue placed upon the value of the banks, less the assessed value of their real estate. Insurance companies were taxed a certain percentage upon their gross premiums for state purposes, less the amount of any county and municipal taxes paid by them on real estate. In addition to this, the franchise value of all other corporations was reserved for taxation by the state. The constitutional provision fixed definite rates to be applied on these several separated subjects of taxation, which rates could only be changed by a two-thirds vote of both houses of the legislature.

While no restriction was placed upon the rate of tax which might be applied to property assessed locally, an almost prohibitive restriction was provided for in the constitution against increasing the tax rate on corporation property.

Merits and demerits of state tax system.

While there were obvious and glaring defects in the new system of taxation, the governor and the legislature wisely decided to give the new system a fair trial before attempting any change. It is possible now to judge intelligently of the merits and demerits of Constitutional Amendment No. 1 from a study of its actual operation.

After an experience extending over several years, the following conclusions seem warranted:

First—The new system is an improvement over the old system, so far as the separation of assessment of public utility and intangible property is concerned. It would be unwise to return to the old method.

Second—With the original rates, it failed as a revenue producer, however, and would have resulted in financial paralysis for the state had it not been for the fact that the legislature responded to Governor Johnson's recommendations by increasing the rates upon the gross earnings of corporations, first at the session of 1913 and again at the session of 1915.

Third—It has not resulted in equality, either as between the corporations and the people or as between the various classes of corporations. An investigation by this commission demonstrates clearly that the little corporations are taxed far more heavily than are the big corporations.

Fourth—It has not, as its advocates promised, tended to correct the evil of under-valuation by counties. Assessment at full value is just as remote today as it was prior to the adoption of the amendment.

Fifth—It has not, as was predicted, lightened the burden upon real property. The burden upon real property is heavier today than it was under the old system.

Sixth—The provision requiring a two-thirds vote of each branch of the legislature to increase rates on the gross earnings of corporations would ordinarily prove prohibitive and should be remedied.

Seventh—It has complicated the tax system, by compelling an altogether unnecessary dual method of fixing tax rates on the property of public utilities—first a rate according to property value, and then a corresponding rate upon gross receipts.

Taxation according to benefits not possible.

There was a strong feeling on the part of the incoming legislature in 1911, as well as on the part of many people who had studied along the lines of equitable taxation, that the system inaugurated in 1910 was fundamentally wrong; that it was wrong from the standpoint of the householder, the farmer and the business man who paid local taxes on the basis of the benefits derived from the local governments, while the public utilities, which also received local benefits, paid a tax simply to the state without reference to the particular needs of the community in which their property had its situs.

Under this system it was soon discovered that if equity was to be preserved as between the two classes of property the necessity would arise every two years, or oftener, to investigate the rates applied against the gross receipts of the public service utilities to determine if the property of such corporations was bearing its proper burden of tax. This meant that the property of such corporations must be valued, and the ad valorem rate obtained which was theoretically being applied to it. This rate must then be compared to the average ad valorem rate actually applied to general property and the rates upon the gross receipts adjusted in accordance therewith.

Other states abandon method retained here.

We thus have the absurd, costly and unsatisfactory practice of applying indirectly an ad valorem tax by going through the cumbersome process of laying a tax upon the gross receipts of public utilities equal in amount to that which would ordinarily be levied directly against their property value.

Wisconsin originally utilized the "gross earning" method, but abandoned it years ago and now assesses all property on an ad valorem basis. New York, up to 1910, had practically the same system of separation and tax on gross earnings as California, but has to a great extent abandoned it. The change was readily made in New York because the tax system in that state is changeable by legislative action.

Prohibitive requirement of two-thirds vote.

One of the most dangerous features of Constitutional Amendment No. 1 is the provision requiring a two-thirds vote of each branch of the legislature to increase the rates to be applied to the gross earnings of corporations.

Experience soon demonstrated that, even under the wisest management, the needs of the state grow faster than the inelastic revenue system upon which the state is dependent for its support.

Should a deficit at any future time arise, as was the case in 1913 and 1915, it will be necessary either to increase the rates of the public service corporations or throw an additional burden upon the people in the nature of a general ad valorem tax.

Although it was perfectly obvious in 1913 that the public service corporations were not paying to the state in the same proportion that general property was paying to the local government, the proposal of Governor Johnson to meet the existing deficit by raising the rates of the public service corporations was vigorously resisted by the corporations. Had they been able to control one more than the necessary one-third of either of the two houses, the rate increase would have been defeated and the only alternative would have been to levy an ad valorem tax and tax the property of the people to make up the deficit resulting from the low rates originally established for corporations.

Future rights of people should be preserved.

Governor Johnson, however, won his fight for the people and the legislature, after a protracted contest, raised the rates of the public service corporations to a point more nearly on a level with the rate paid by general property.

But the people may not always have an executive courageous enough, and powerful enough, to carry through a rate increase, even though the justice of such increase may be as apparent as was the case in 1913. The inevitable result would be an addition to the already heavy tax burden borne by the people.

No time should be lost in correcting this particular feature of the present tax system, making the revenue laws more elastic and modifying the present prohibitive two-third requirement for rate increase by the legislature.

Absence of restriction on state expenditures.

From the standpoint of state expenditures the figures show that since 1910 there has been no greater increase in the percentage of appropriations than existed before 1910. In fact, a comparison of the percentages shows an actual decrease, this being accomplished, however, through extraordinary control and insistence on the part of the state administration, which was working under the determination that economy should be practiced.

The restraining influence upon extravagance under the old system was the realization that in voting appropriations a legislator was spending the money of his constituents, and would by them be held strictly to account for extravagances. Every dollar of increased expenditure was reflected in the tax bill that was presented for payment to each taxpayer in every assembly and senatorial district in the state. Tendencies toward extravagance in state appropriations were to a certain extent restrained because of the fact that it meant the direct expenditure of money raised locally.

Under the present system this direct responsibility upon the members of the legislature has been completely lost. The taxpayer now has no realization through the actual payment of a tax for state purposes of what an additional state appropriation means. The argument which under the old system could be advanced against additional appropriations has been reversed, and now, if an appropriation is asked for the argument frequently advanced is that ''the corporations pay the tax and it is not a local burden.''

Should restore direct interest in state affairs.

It is not easily discernible that although the corporations pay the state taxes, any extravagance ultimately is shoved off upon the people in the form of increased light, heat, power and transportation charges. It easily is forgotten that if extravagance results in a deficit such deficit is apt to be met by an ad valorem tax levy on all property.

Some device is needed to restore the people's direct, pocketbook interest in state appropriations.

As a result of this condition the complete burden of holding down the expenses of the state has passed over upon the shoulders of the governor. This is unwise and unfair and a dangerous condition to be allowed to exist.

Amendment No. 1 allows local extravagances.

In the matter of local expenditures, on the other hand, the total separation plan has increased the tax burden over what it would have been under the old method. This is primarily due to the fact that there were no adequate tax limitation laws.

Unfortunately, no limitation was placed upon county or district expenditures at the time the change was made in 1910, and while many of the counties and municipalities gained because of the separation they not only took advantage of the natural gain but also increased their expenditures to the extent of thirty-five or forty cents on the local tax rate which previously had been levied for state purposes. This serves only as an additional demonstration of what usually occurs when a distinct change in taxation or assessed values takes place without restrictions limiting the increase in tax levies.

The public utilities are now exempt from local taxation, so that "the people pay the taxes" for local expenditures. The property of the corporations is benefited by every dollar expended for local improvements, but they bear no part of the cost under the present plan of separation.

Present system proves expensive and confusing.

Another objection to the present system arises from the fact that it is confusing, expensive and extremely unsatisfactory to continue the attempt every two years to equalize the burden of tax borne by public service corporations and that borne by locally assessed property. The only way that permanent relief may be accomplished is to have both classes of property taxed on the same ratio of value, which should be a full value at the situs of the property. This can be done effectively only through a central control of assessment.

Individual affected by state and local expenses.

It is true, we believe, that there can be no fundamental difference between the individual's interest in the expenditure for local purposes and his interest in the expenditure for state purposes. There is a complete relationship between the individual, the state and the political subdivision. In fact, a large part of the revenue that the state obtains through its separated source goes back and is expended locally for schools, free textbooks, mothers' pensions, etc., and for this reason, if for no other reason, there should be a financial interest on the part of the individual taxpayer in the burden of tax that is levied for both state and local expenditures. Every individual taxpayer should know just what the relationship is between state expenditures and local expenditures, and, further, that his burden is no heavier than that of other classes of taxpayers.

County and municipal losses not equalized.

Finally, there is the serious objection to the present system of taxation because of local losses on account of the withdrawal of operative railroad property from local taxation. It has been found difficult to adjust these losses equitably where the constitution permits of such adjustment and, in fact, after 1918, no further adjustment of these losses will be made, and some of them will be seriously felt in certain communities.

In addition to this, there are losses sustained by the withdrawal of other than railroad property in some municipalities and counties which can not be adjusted under the constitution, and in many instances these inequalities will be emphasized and the losses augmented by the development of public utilities.

As will be seen in the statistical tables printed at the end of this report, the percentages of operative or withdrawn property vary considerably in the different counties and municipalities. This in itself produces a grave inequality which works to the disadvantage of many localities. It is fundamentally wrong to segregate properties of the same character and in the same community and tax the two classes of property thus segregated for separate and distinct purposes, preserving no relationship between the two on the basis of local benefits and needs.

Sufficient revenue not sole object.

The one principal argument advanced in favor of the present system is that it has produced enough revenue for state purposes. This is true, but only by the raising of the original rates established in the constitution. Under any system of taxation enough money can be raised. There was no trouble as to amount of revenue under the old system. It is a weak argument for any method of taxation merely that it raises enough revenue.

The scheme of separation has accomplished very little relief in the regeneration of the general property tax in this state. The bulk of the taxes borne by property owners is being assessed and levied under the same unsatisfactory conditions that obtained prior to 1910.

Results accomplished under Amendment No. 1.

Amendment No. 1, however, has resulted in some advancement toward a better and more equitable system of taxation. It has produced revenue from values which formerly were taxable but which were not assessed, or were under-assessed, prior to its adoption. This is particularly true with regard to banks and franchise values. It has demonstrated beyond doubt the fact that certain classes of property of the nature of those separated under the scheme can be taxed properly only when they are assessed by a central system of valuation, and it has demonstrated beyond doubt that any attempt at local assessment of the classes above mentioned is inadequate, inequitable and productive of political and economic dangers.

THE BURDEN OF LOCAL TAXATION.

The work of most immediate importance undertaken by the investigation was that of determining the relative burden borne by property taxed locally and property of public utilities separated for state taxation.

The methods of levying taxes upon the two classes of property—that upon general property by the application of an ad valorem rate and that upon public service utilities by a rate upon gross receipts—rendered it necessary that a complete study be made of the actual taxable values underlying both classes of property.

In another part of this report we present the valuations placed upon public utility corporations through the stock and bond method of valuation, showing the average burden of state tax on each $100 of actual value of such corporations.

Method of determining burden of local tax.

In order to arrive at the average burden borne by property taxed locally it was necessary for this commission to establish as closely as possible the actual value of general or nonoperative assessable property in the state. To establish this value appraisements were made in thirty-eight of the principal counties, which appraisements were substantiated and corroborated by other data obtained from the appraisements made by the State Insurance Department, the State Banking Department and the State Inheritance Tax Department. There was also obtained, where possible, private, public and probate sales data. Most of this comparative data, however, could be used only in a very general way because the properties involved were too scattered and not fairly representative in many instances. The most substantial figures for comparison were those obtained from private sales and from the valuations placed upon properties passing through the probate courts.

General results of property appraisements.

As a result of these appraisements it was shown that the average percentage of assessed to true value in the state for 1915 was 41.991 per cent. The average for 1916 was 42.755 per cent. In the tables of appraisements appended to this report will be found the percentage for each county as a whole and also a segregation showing the percentages for inside and outside properties.

It is interesting here to note that of about a thousand replies from different parts of the state received from individual property owners as to the assessed and actual value of their properties in 1915, a figure of 41.14 percentage of assessed to true value was shown.

The accuracy of the method of determining actual values from the federal stamp tax on transfers of real property was investigated. This commission concluded that the cost involved would not be warranted by the results to be obtained because of the fact that on property transferred under contract sales only the actual amount passing at time of transfer need be stamped; because mortgage interests were deductible and not easily identified; because it was the practice in some instances to over-stamp in order to boost property prices, and because in some cases of trade sales it would require actual appraisement of the properties to determine whether the amount of stamps indicated a true cash basis.

Selection made of representative properties.

To start with, the commission made a general survey of the state, selecting the counties in which lies over ninety-three per cent of the taxable wealth of the state. The commission then took up each of these counties separately and made selections of representative business, residential and outside acreage properties which formed the basis upon which to establish the actual value of property, applying to the total assessed value of the different classes of property in each county the ratio obtained by a comparison of the assessed and appraised values of the properties selected.

Qualified appraisers chosen for work.

In most cases the inheritance tax appraisers in the different counties acted as the appraisers for this commission. After discussing with many business men and officials the matter of the best source by which proper appraisals could be made in the different counties, the conclusion was reached that the best results could be obtained by the aid of these appraisers. In most of the counties these appraisers have had years of experience in appraising property for taxation purposes, to wit: the inheritance tax, in which it is the desire of the state to arrive as near as possible at a true and accurate value of the property as of a certain date. The appraisers in question have operated under conditions which would naturally place them in a position to arrive at fairly accurate values. Their duties in representing the Inheritance Tax Department are such as to place them in competition with those who may question their values in representing the estates which are subject to tax and also place them in a position of having to substantiate their values finally before the courts in the county. The values so established by the various appraisers finally receive judicial recognition as the proper and true value of the property under consideration.

In addition to this, these appraisers gather together annually, or oftener, to exchange views on methods of valuing and other matters incidental to their office, and in this way much towards uniformity has been accomplished.

In the light of the above facts the commission felt that an appraisal by this body of men, where obtainable, would approximate more nearly a true value of the representative properties selected by this commission in the several counties. In a very few of the counties where the inheritance tax appraisers were very recently appointed or were overburdened with duties of their own department it was necessary to make selections of other persons who were recognized in the community as having the best knowledge of property values.

Appended to this report is a list of the appraisers selected in the several counties. Credit for the accuracy in establishing the true value of property required in connection with this phase of the commission's work is due to the high character and ability of this group of experienced appraisers.

After the selection of the appraisers, lists of the properties, with full descriptions, were submitted to them, with the instruction that the full and true value of each parcel be obtained and returned to this commission. All of the appraisers were impressed with the fact that this commission desired a value which could reasonably be substantiated and that, particularly, it was the desire that neither unusual, inflated nor depressed values be submitted on any of the properties selected. The appraisers were informed that if any properties selected should prove to be of such an unusual type that they would fail to reflect a true condition, such properties should be eliminated after consultation with this commission. In a few instances properties were so eliminated from the list as originally made out.

Results of appraisements were made public.

Upon receiving the appraisement of these properties by the different appraisers this commission threw open the results of the appraisals for public scrutiny and examination. In a number of instances individuals examined the records and presented criticism of the established values. The principal investigation as to the fairness of the appraisals was that carried on by representatives of the public utility corporations. This commission invited the fullest consideration of the appraisals in question and provided every convenience and facility possible to all individuals and to the representatives of the public service corporations in order that they might as quickly and easily as possible satisfy themselves as to the fairness of the work done by the appraisers.

Exception was taken to a few of the appraisements in seven of the thirty-eight counties. Upon the presentation of these exceptions the commission took up the matter with the different appraisers in the counties affected and arranged for meetings between the corporation representatives and the appraisers. The commission made it plain to the appraisers that it desired everything done that would result in a just value being placed upon the appraised properties; that if any tangible evidence be submitted which would in any measure change the figures they had placed as the value upon the several properties, the same should be fully and seriously considered and any adjustment made that was reasonable and proper. In a few instances changes were made by the appraisers and accepted by this commission.

In several of the counties the appraisers, after their hearings with the representatives of the public service corporations, wrote this commission that the only change that could be considered by them would be one suggested by a corporation representative, namely a uniform increase of the value of the properties in question upon the basis of what the sales value might be for a period of a year or two in the future. Inasmuch as the appraisements in question were made during the assessing period of 1916, and were to be used in comparison with the assessed values established as of March, 1916, this commission immediately refused to consider any such proposition. It felt that it would be an inconsistent and erroneous method of arriving at the proper values.

Appraisals submitted to county assessors.

The appraisal figures were submitted to the different assessors of the several counties for criticism and suggestion and in some cases changes were made because either of errors in the assessment figures and descriptions of the property or because of additional data which, upon consideration by the commission and the appraiser, warranted the fixing of a different value.

The commission also considered data and suggestions presented from private sources.

After such checking of the appraisements made in the different counties as it was possible from all sources of information, this commission is thoroughly satisfied that the average results arrived at by the appraisals from the different counties are reasonable and just.

Determining true value of property.

The appraisement covered only land and improvements. The actual value on these was computed by taking the percentage of appraised to true value of the selected properties, segregated into three distinct units—(*a*) land inside, (*b*) improvements inside, (*c*) land and improvements outside—and working out the total for each and then combining them for the final figures. In arriving at the true value of property in counties where no appraisements were made, the average percentage for the appraised counties was applied. Inasmuch as the unappraised counties represented only about seven per cent of the assessed value of the state, no appreciable inequality could possibly creep in by reason of the method pursued.

Determining value of personal property.

The matter of treating personal property and money and credits was one which caused considerable debate. The commission from its investigations over the state felt that the assessment of personal property, such as stocks of goods and merchandise, live stock and machinery, was very closely on a par with land and improvements. Personal property, such as household goods, libraries and other forms bought for personal use loses most of its intrinsic worth after passing into private hands. However, such property is an unknown and negligible quantity, and if the same percentage is applied to this class of property as is applied to other property the true value will be approximated.

Trouble estimating money and credits.

In the case of money and solvent credits, much trouble was encountered. It was finally decided that the application of the same percentage as that for other property would come as near true value as any other estimate. What solvent credits are taxable after allowable deductions are made it is impossible to approximate. Neither can it be said that the commercial deposits in banks on the first Monday in March is an index of the taxable money. How much of such money is nontaxable because it belongs to public service corporations; how much of it can be considered as solvent credit with allowable deductions can not be intelligently conjectured. It was claimed by the representatives of public service corporations that the money on deposit represented the balance between solvent credits and deductable solvent debts. This commission is unable to arrive at such determination. We prefer to let the question of money and solvent credits rest on a basis with other property.

Final result of full valuation.

As a result of these calculations, the following summaries are obtained:

In the Year 1915.

Total assessed value of nonoperative property	$2,792,855,747 00
Total actual value of nonoperative property	6,651,017,512 00
Average percentage of assessed to actual value, 41.991.	
Total general county taxes levied	$46,147,221 29
Total special district taxes levied	14,191,286 81
Total city taxes levied	20,875,616 93
Total of all taxes levied	$81,214,125 03
Average rate of tax levied on each $100 of value, $1.2210.	

In the Year 1916.

Total assessed value of nonoperative property	$2,917,323,351 00
Total actual value of nonoperative property	6,823,195,932 00
Average percentage of assessed to actual value, 42.755.	
Total general county taxes levied	$47,135,803 67
Total special district taxes levied	13,739,231 89
Total city taxes levied	21,654,134 85
Total of all taxes levied	$82,529,170 41
Average rate of tax levied on each $100 of value, $1.209.	

If the license tax is figured in as a factor, as it should be for 1916, approximately $850,000 would be added to the total taxes, raising the average rate from $1.209 to $1.2219 on each $100 of value.

VALUATION OF PUBLIC UTILITIES.

For comparison with the burden of taxation borne by other classes of property, taxed on an ad valorem basis, it was necessary to arrive at a property value for the public utilities. Of all methods available the stock and bond method seems to be the best for two reasons:

First—It closely approximates the definition of value given in the Political Code, which reads:

> The terms "value" and "full cash value" mean the amount at which the property would be taken in payment of a just debt from a solvent debtor.

Second—The stock and bond method gives a definite figure about which there can be little dispute and which depends very little on the judgment of him who makes it, but does reflect the combined judgment of "thousands of men constantly endeavoring to surpass one another in the fullness and accuracy of their knowledge of the value determining factors affecting any given security."

The question has been raised whether it results in a value that is properly comparable with the value (the full value, not the assessed value) used by the assessors or by this commission's appraisers in valuing other property. The method by which the value of property locally assessed and taxed was arrived at is already explained. It is obvious that the two methods are different. They had to be so. One can not value a house and lot by the stock and bond method, nor appraise a railroad on the basis of the prices paid for other railroads. There can be no exact correspondence of the results. How nearly the resulting figures are comparable is and must remain a matter of opinion. Able and experienced tax attorneys for the public utilities have urged that the stock and bond method includes elements of value in the properties of public utilities which exist in, but are not included in the appraisal of, the value of property taxed locally. The following letter from Mr. George G. Tunell, representing the Atchison, Topeka and Santa Fe Railway system, states their argument very clearly, as follows:

> *State Tax Commission,*
> *Sacramento, Cal.*
>
> GENTLEMEN:
>
> "In the autumn of 1912, I contended at the hearing in Sacramento that the stock and bond method of valuation gave a larger value to the property of the Santa Fe Railway than any other method that could be regarded as worthy of consideration. I expressed the opinion that this method took into consideration every item and every element of value. Under this method of appraisal the public utilities were appraised as units and as going concerns, while manufacturing, mercantile and other establishments which

also have a going concern value were appraised on the basis of the value of their real estate, buildings and stock treated as separate and unrelated items of property.

"Speaking of the different methods followed in valuing the two classes of property, Professor Plehn said:

" 'It must be admitted that this method will generally give the highest value that can be arrived at by any approved method of valuation. The result by this method undoubtedly includes some elements of value not included in, and hence not comparable with, the appraised values of property locally taxed as set forth in the first part of this report, and your attention is respectfully directed to these objections to the method.

"In spite of its admitted weakness, however, this method of valuation is practically the only one available that is based on concrete facts and is practically free from assumption, hypotheses, and theories.

"With proper allowance for non-comparable elements of value included it can be used to check the more theoretical results above set forth.'

"It seems to me, and I can not emphasize the point too strongly, that you are the persons who should make proper allowance for the different methods you have followed in valuing the "withdrawn" property which pays the state taxes and the local property which pays the local taxes. You are not only the proper person to do this work, but the only persons who will have the information to make the proper allowance.

"If you give the governor or the legislature a 'concise summary' of your results, as the State Board of Equalization did in 1912, without making the allowance or adjustment about which I have been writing, you will do us a grave injustice. In the rough and ready handling your report will receive in the public press and in legislature, if you follow the plan of 1912, your explanation that the two classes of property are valued on different basis and are therefore not comparable, will become separated from the tax rates you state the different classes of property are bearing.

"I sincerely hope that the Tax Commission in its report will make a definite addition expressed in figures to the tax rate it states the corporations are paying to offset the difference in methods it is following in the valuation of the two classes of property. An explanation in words will not meet the situation. The addition should be in the form of a percentage.

Yours very truly,

George C. Tunell.

The commission replied to this communication as follows:

"The subject of your discussion is one which the commission will take up for serious consideration, and if it can be clearly demonstrated that allowance should be made for this factor, this commission will feel under obligation to make definite recommendations to the legislature.

> "We presume that yourself and others interested in the valuation of the different public service corporations in the state will be prepared with data a little later on concretely to demonstrate some approximate percentage, if such exists, which enters into the final determination of this commission in adjusting the values determined for the public service corporation property and those determined for general property. Full opportunity will be given in hearings before the commission for the presentation of facts and figures relative to this and other questions which will arise in the final determinations to be made by this body."

The substance of the argument by the public service corporations is that the average ratio of taxes to the stock and bond values, which was found to be 1.2566 per cent, should be taken and raised by an estimated amount, say one-quarter of one per cent, on the theory that by so doing a proper allowance would be made for the elements in the stock and bond value of the utilities not included in the value of the other properties.

No alteration made in figures.

This commission has not, however, seen fit to make any alteration in the results of the stock and bond method, but has presented the figures just as they came out of the computations. It was felt that to change them by adding arbitrary amounts or ratios assumed to make them more comparable with the values of tax ratios on other property would be to substitute something quite arbitrary, hypothetical and theoretical in place of the definite figures which the stock and bond method gives. That there is some force to the argument must be admitted, but the allowance to be made, if any, can not be reduced to a definite figure capable of proof.

On the other hand, it can be argued with equal force that the stock and bond method of valuation does not reflect the highest value of public utilities at this period when unusual world conditions unstablize all investment securities. At such a time real estate values are affected much less than these other values. While the assessed value of real estate increased from 1912 to 1916, the total value of public utilities by the stock and bond method has shown a slight decrease. At the same time the gross and net receipts of these companies have considerably increased, indicating a probable increase in sound values. It might be claimed on the other hand that the stock and bond method reflected too much speculative value in 1912.

In some aspects the argument raises questions regarding the general theory of the tax system, as to what should be taxed and what not taxed. Thus, the "going value" of manufacturing, mercantile and other establishments has never been taxed in California, while it is quite true that the same element in the property of public utilities has always been aimed at by the taxing authorities. The legislature in adjusting the rates to public utilities has proceeded on the theory that it was endeavoring to make the burden of these taxes correspond as nearly as it could do so to the burden borne by other property actually taxed locally. It is, of course, clear that if other things not now taxed were to be placed on the assessment rolls the tax burden on real estate might be reduced. But, as things are, under the existing system, the comparison runs between property taxed for state purposes and property taxed for local purposes.

This commission is unable to determine any actual inequality in the method used, and the companies interested have not presented any tangible evidence upon which to warrant allowance.

Report on stock and bond valuations.

The services of Professor Carl C. Plehn of the University of California were secured to make a stock and bond valuation of the separated public utilities. His report is as follows:

STOCK AND BOND VALUATION OF PUBLIC UTILITIES.

The "stock and bond" values of the properties of those public utilities which are taxed on the basis of their gross receipts, excepting a few small companies which could not be so valued, together with the taxes paid and the ratio of the taxes to those values, have been found to be as follows:

Companies	Value	Taxes	Ratio. per cent
Railroad companies	$519,620,000	$6,789,063 34	1.3065
Gas and electric companies	224,902,300	2,438,576 64	1.0838
Telephone and telegraph companies	60,714,250	848,790 92	1.3983
Express companies	3,705,000	83,954 28	2.2660
Car companies	11,665,000	151,295 02	1.2970
All classes	$820,606,550	$10,311,680 20	1.2566

The meaning of a "stock and bond" valuation.

The values in the foregoing table were obtained, as stated, by the so-called stock and bond method. This consists in:

First, ascertaining the aggregate value of the property of each company by multiplying the number of shares of stock and the number of the bonds, issued and outstanding, by the market values of the different securities, as ascertained from quotations upon the stock exchanges, or from sales, or from offers to purchase the securities. When data concerning actual sales, or offers to purchase, were not obtainable the value of a given stock or bond was ascertained or fixed by capitalizing the dividends, or profits, which the stock was earning, or, in the cases of bonds, the interest being earned; or, more generally stated, by reference to the earnings of the company, due regard being had to the safety of the security as an investment.

As this process gives the value of all the holdings of the company, including nonoperative property otherwise taxed, investments and the like not covered by the taxes on the gross receipts, it was necessary:

Second, in order to arrive at the value of the property covered by the gross receipts tax, to deduct from the aggregate value of the securities found: (1) the value of any nonoperative property, within the meaning of the tax law; (2) the value of any nontaxable property, or securities held; (3) the value of any intercorporate holdings representing property taxed otherwise; and (4) the value of property outside the state.

Interstate properties.

In this investigation interstate properties have first been valued as a whole, covering that part outside as well as that part inside the state. Then, the nonoperative and other proper deductions having been made, the remainder has been divided between the state and outside in the same proportions as were the taxable gross receipts inside and the gross receipts outside of the state. Thus, for example, the value of the Southern Pacific system as a whole, less nonoperative property, was found to be $577,600,000. Forty-four and three-tenths per cent of the total business of the system is done in California. Hence, the value of that company's property in California was taken to be 44.3 per cent of $577,600,000, or $255,876,000.

The extent to which quotations were obtained.

In the case of all the large companies, and of many of those relatively small, actual quotations were obtained for all the more important issues of securities. Thus, out of the total of the values arrived at for the railroads, ninety-two per cent were based primarily on quotations. Similarly, for the gas and electric group, ninety-four per cent of the values are based primarily on quotations; and for the telephone and telegraph group ninety-two per cent.

The sources of the quotations.

The quotations were obtained from the official reports of the San Francisco and Los Angeles stock exchanges, from sales published for each business day in the San Francisco journal known as *Finance and*

Trade and from the weekly issues and monthly quotation supplements of the *New York Commercial and Financial Chronicle.*

The averages.

The prices used were the averages for the fifteen months from January 1, 1915, to March 31, 1916. This period was chosen because the stock exchange in New York was closed for six months preceding December 15, 1914, on account of the war, and there were, therefore, only fifteen months consecutive quotations available prior to April 1, 1916, when this work was begun. Each month's quotations were averaged separately, and then the average of the fifteen monthly quotations was taken.*

Valuations by analogy.

In the case of the smaller issues of securities which were not quoted, but were issued by companies which had securities outstanding that were quoted, it was possible to compute the price of the small issues by analogy. Thus, for example, the Pacific Gas and Electric Company, most of whose securities are quoted, has outstanding an issue of bonds, known as the Blue Lakes Water Company's six per cents, due in 1938, which are not quoted. It was found that other bonds of this company of similar seniority and security were quoted as selling on a five per cent basis. By a bond table it was found that a six per cent bond with twenty-two years to run would yield five per cent if bought at 113 per cent. Hence those bonds were set down as if quoted at 113 per cent.

Capitalizing earnings.

In the case of a security which was not on the market, and whose value could not be ascertained by analogy, it was necessary to capitalize the earnings which belonged to that security. Thus, for example, a given company whose stock was not on the market was found to be earning, say, $1,000,000 a year, over and above operating expenses. Of this million dollars, $750,000 went to pay interest on the bonds and taxes, leaving $250,000, which techinally belonged to the stockholders. But out of this $250,000 we find, perhaps, that, under orders of the Railroad Commission, $100,000 must be set aside for depreciation, sinking funds, and other purposes deemed necessary to protect the bondholders and to ensure, to the public, good and continuous service. There would thus be only $150,000 a year going to the stockholders outright, which they may use as they see fit. If this net income of $150,000 is fairly safe and sure, we have assumed that it should be capitalized at eight per cent, which seems to be about what the Railroad Commission uses in its computations in similar cases, and what the market requires to keep such a security at par. For bonds, of course, the rate is lower. If the business of a company was hazardous, the earnings have been capitalized at higher rates, proportionate to the risk. But such cases were few in number.

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*A rough indication of the amount of work involved is afforded by the fact that about 30,000 quotations and over 25,000 sales were tabulated and averaged.

While the foregoing assumptions as to the proper rate to use in capitalizing earnings are obviously debatable, they seem to be as reasonable as any, and it may be further pointed out that any error involved in the use of such assumptions would be so small in itself, and would affect so small a part of the total valuations, as to be negligible. The error, if there be one, would affect our ratios in the fourth decimal place only, even if it were as large in the first instance as twenty-five per cent.

Special reports on prices.

In some cases the companies have reported private sales of stocks or of bonds not publicly quoted, and this information has been used to supplement our quotations. In other cases the companies have reported their estimates of what the securities should sell for. If these were sustained by the income they have been accepted.

Sources of information on company accounts.

The data as to the amount of the stocks and bonds outstanding, and as to gross receipts, net earnings and the like, were taken from the reports required by law to be filed with the State Board of Equalization. To guard against possible errors, lack of uniformity and the like, these reports were checked by the reports published in Poor's Manual of Railroads and Manual of Public Utilities, and by the reports filed with the State Railroad Commission.

Values other than stock and bond values.

In a relatively small number of cases resort was had to some other basis than a strict stock and bond value. Thus, for example, the Death Valley Railroad, built by a borax company primarily to reach its deposits, was taken at its book value, in view of the fact that it has been built under the general supervision of the Railroad Commission and there seemed to be every reason to believe that its book value corresponded closely to its true value. Again, in the case of the Western Pacific we accepted the finding of the court, which placed the aggregate value at $18,000,000. We did not feel inclined to place our personal opinion in opposition to the decision of so august a tribunal. Moreover, it so happened, that a stock and bond value would give a result only a quarter of a million higher than that arrived at by the court.

Deductions for nonoperative property.

The determination of the amount and value of the deductions for nonoperative and similar property or holdings presented special difficulties and each case had to be studied on its own merits. Many suggestions for general rules were submitted by tax agents, such as using a fixed multiple of the assessed values. But none of these suggestions were found to be feasible. In this part of the work, however, great assistance was obtained from the complete and detailed reports on file with the Railroad Commission. Special thanks are due to Messrs. Sinsheimer, Reynolds and White of that commission's staff for courtesies extended in this connection. The decisions of the Railroad Commission, its orders, investigations and valuations were constantly referred to and used in so far as they served to throw light upon our problems.

Bankrupt companies.

Companies in the hands of receivers or undertaking refinancing presented, on the whole, less difficulties than were anticipated. The conditions of the investment market at the present time are such as to give a very fair indication of the value of such of the securities of companies in that condition as have any value at all. Only in one case, namely, that of the Ocean Shore Railroad, did the difficulties prove to be such that the valuation had to be given up.

Companies omitted.

There are, of course, a number of small companies to which a stock and bond method of valuation will not apply. Some of these are not incorporated and are ''companies'' only in the technical sense in which the tax law defines companies. Others are operating as public utilities only incidentally, in connection with some other business more important to them. Thus, a mining company develops power for its own use and sells some for lighting purposes to a neighboring village. There are, also, a variety of other reasons why companies had to be omitted. The omission of these companies was necessary because their inclusion would have improperly disturbed the averages, slightly, perhaps, but to some extent, at least. Among the telephone companies in particular there are a large number of small companies for which no valuation was attempted. Many of these are farmers' mutuals, some utilizing wire fences as the means of communication. These depend upon assessments for the necessary expenses of upkeep and can have no commercial value in any proper sense.

Special cases. *A. United Railroads.*

There are a few special cases which need mention. Among these that of the United Railroads of San Francisco is the most important, on account of its size. This company presented special difficulties. In the first place, the control of the company's finances is very complex. It is controlled through two finance companies, which are in turn related to one another. One of these is the United Railways Investment Company of New Jersey, and the other is the California Railway and Power Company. These companies control the United Railroads of San Francisco through ownership of stock. But besides owning the stock of the United Railroads, each of these companies is the owner of the stock and securities of other companies. Some of these other companies own properties located in the East. Thus, the United Railways Investment Company owns properties located in Pittsburg, Penn., and the California Railway and Power Company owns the stock of two power companies in California, as well as its interests in the United Railroads. Quotations can be had of some of the stocks of each of the two financing companies, but no one can tell exactly how much of the value of those stocks is due to the interest they represent in the United Railroads, or whether, in fact, that interest is more a liability than an asset. To segregate out the values by an analysis of the two financing companies would involve the use of assumptions upon which it is hardly possible that any two persons would agree.*

Another difficulty arises from the fact that the principal franchises under which the United Railroads uses the streets of San Francisco are soon to expire. The vital ones expire in from eleven to twelve years. It is impossible to foresee what will happen to the company at the end of that time. It may be that the city will renew the franchises; it may be that the United Railroads system will become a part of the municipal railway. These uncertainties are reflected in the market price of the bonds.

The outstanding bonds and notes of the United Railroads, for which a direct valuation by quotations can be had, were worth on the average for the fifteen months, in round numbers, $25,250,000. The prices have varied greatly during the fifteen months. It is claimed that since the larger issues of bonds were selling early in July as low as $30 on the hundred that the bonds at that figure represent all the value there is to this company's property. But on careful analysis the case does not appear to be so bad as this. There is an annual surplus available for dividends or betterments after paying all interest and taxes, including also the depreciation charge of $550,000 per annum which the railroad commission has recently required. This surplus amounts to something like $350,000. If, in view of the uncertainty of the life of the company, we capitalize this at the high rate of twelve per cent, it would be worth $3,000,000. There is also the possibility of some salvage on cars and the like in case of the dissolution of the company. There is, further, some value in the minor franchises which have a longer time to run.

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*The foregoing statement was written before the announcement in the public press of the plans for reorganization, July 23, 1916.

It appears that the United Railroads is practically certain to earn, over and above operating expenses, about $3,000,000 a year for the next twelve years. The present value of $3,000,000 a year for twelve years at six per cent is a little over $25,000,000, or almost exactly the market value of the bonds. It seems clear, then, that this is the minimum value of the property. In fixing the value at $29,700,000, we have taken into consideration all the factors involved and while it is, in part, admittedly an estimate, it is believed that the result is as close to the present value as can be found.*

Special cases. *B. Large electric companies.*

All the large electric power companies, but notably the Great Western Power, the Pacific Gas and Electric Company, the Pacific Light and Power Company and the Southern California Edison, show relatively low ratios of taxes to values, and being so large are the main cause of the low ratio of taxes to value shown by that group. The reason for this seems to be that those companies are still, to a large extent, in the development stage and the market value of the securities is high for the *present earnings.* All of these companies have plants which have cost a lot of money, but which are not yet working to their full capacity. The investor evidently believes that the future of these companies is brilliant. This is the only explanation possible for the fact that the securities of these companies were selling on about a five and one-half per cent basis in the same markets in which one can buy good railroad bonds that will yield him from six to six and one-half per cent.

These electric companies show, also, a low expense ratio and consequently a high ratio of net to gross. This makes it possible to support more capital for each one hundred dollars of gross receipts than is the case with other classes of companies which have a higher expense ratio. It appears, however, that as companies of this sort grow older, utilize their plants more nearly to capacity, and as the plants grow older, this condition passes away. It may, therefore, probably be assumed with safety that the low ratio of taxes to value is a passing feature with these companies. As an example of the change which comes with time, it may be pointed out that the ratio of taxes to value for the Great Western Power was 0.2684 per cent in 1912 and in 1916 is found to be 1.0869 per cent.

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*Since this valuation was determined upon and reported to the State Tax Commission the reorganization committee of the United Railroads has arrived at a sound value for this property of $29,500,000, indicating the extreme care exercised in the figures presented in this report. Undoubtedly the committee considered the reduced earnings of 1916 which data could not appreciably enter into the determination of value as of March, 1916.

The uniformity in the results.

One striking feature of the results of this investigation, as compared with the similar investigation made under the auspices of the State Board of Equalization in 1912, is the greater uniformity in the ratios for the different companies in the same group. Thus the lowest tax ratio for railroads is 0.9205 per cent and the highest, if we except certain cases that are obviously anomalies, is 1.6937 per cent; the difference between the highest and the lowest is about 0.7 per cent, while in 1912 the range was from 0.3417 per cent to 1.6588 per cent, the difference being 1.2 per cent. In the same way, the range for the gas and electric group is from 0.9731 per cent to 1.7148 per cent, a difference of 0.7 per cent, as against a range from 0.3089 per cent to 4.4112 per cent in 1912, with a difference of 4.1 per cent. The same thing is true of the telephone and telegraph companies, whose ratios show a range from 1.0250 per cent to 1.8040 per cent, a difference of 0.779 per cent, as against a range in 1912 from 0.6286 per cent to 2.5014 per cent, a difference of 1.9 per cent.

The reasons for the greater uniformity found seem to be two. First, we have the work and influence of the railroad commission in the direction of uniformity and accuracy of accounting. The accounts now show more nearly the true state of affairs than they did in 1912. The change is illustrated by Decision No. 2397 of that commission, in which exception was taken to the setting up of a ''surplus'' by the United Railroads of $1,200,000 to take the place of like amount of stock canceled, despite the fact that the stock canceled had very little real value. Many such fictitious items, formerly carried under the theory that they were necessary in order to make the books balance, have been eliminated from the accounts by the railroad commission, and as a result it is more feasible to arrive at the true values behind the figures than it was in 1912.

Second, the state of the investment market is such that the investor is more cautious than he used to be and he demands a clear showing of sound values. He has, moreover, better opportunities than ever before, of getting information as to the facts that lie behind the glowing prospectuses sometimes published. It appears now that there was some ''water'' in the values of the companies as found by the quotations of the stocks in 1912.

Small versus large companies.

In 1912 it appeared, generally speaking, that the gross receipts tax imposed a heavier burden on the small companies than on the large. If that were ever true, and it now seems more than likely that the showing was misleading, resulting from the causes just discussed, it is no longer true today.

The effect of the high interest rates.

The rate of interest, that is, the cost of money, was higher during the fifteen months included than it was in 1912, and consequently one would expect to find the prices of securities lower. How much this has affected our figures it is not possible to say, because the underlying properties have changed also in the interval. A comparison of some of these securities representing properties that have not changed much seems to show a drop in prices of from three to four per cent. Thus, for example, the stock of the Santa Fe was rated in the investigation of 1912 at 101, and in the present investigation shows an average price of 97.6. The aggregate value of the property of the Santa Fe in California has shrunk from $88,900,000 in 1912 to $80,500,000 in 1916, while that of the Southern Pacific has also fallen from $289,900,000 to $255,900,000. This shinkage is not all due to the fall in the prices of the securities. It is due in part also to the diversion of traffic by the Panama canal, which, together with other causes such as the growth of population in the Rocky Mountain states, has lessened the proportion of the total business of these companies which is done in California. Thus, in 1912, 16.7 per cent of all the business of the Santa Fe was done in California, now it is only 15.6 per cent; while that of the Southern Pacific was 48.7 per cent Californian in 1912 and is now only 44.3 per cent.

The inequalities in the tax rates.

It was the intent of the legislature in 1915, when it last readjusted the rates of the gross receipts taxes, to impose on all classes of companies a tax that should be, as nearly as possible, equal to 1.20 per cent of the value of the property used. In so far as the stock and bond value is at all an indication of the values of the properties used, it would appear from the first table that this intent was more than realized on the average for all companies, but that in no one class was it exactly reached. By that standard the railroads are ten one-hundredths of one per cent too high, the gas and electric companies are low, but that may be attributed in part to the special factors discussed above. The rates on the telephone and telegraph companies are higher than it was intended to make them by nearly twenty one-hundredths of one per cent, those on the express companies very much higher still, namely, too high by over one per cent, and those on the car companies are the nearest to the intended tax.

The heavy tax on express companies.

With regard to the express companies, the reason why the tax ratio is so high is well known. Those companies are suffering from the competition of the parcels post and have not yet recovered from the reduction of their rates of service by the interstate commerce commission and the state railroad commission. The tax rate fixed before these causes had reduced the values of the stocks should now be readjusted to meet the new conditions.

Street railway taxes.

With regard to groups within the main groups it is necessary to make a brief comment on the street and electric railways generally. These companies in California are at present laboring under difficulties. Not only has automobile competition destroyed the hopes of rapid growth of revenues that were once entertained, but many of them are laboring under a load of bond interest that is too great to carry. Since this condition has been publicly laid to the door of alleged excessive taxation, it is proper for us to comment on it. Thus the committee on the reorganization of the San Francisco-Oakland Terminal Railways (the Key Route system, with allied street railways) says in its circular:

> "*Street railway companies in California must be relieved from the present excessive burden of taxation.* These companies are required to pay to the state a direct tax amounting to 5¼ per cent of gross earnings. This tax, however, does not relieve them from the obligations of their local franchises, which usually require a payment to the municipality issuing the franchise amounting to 2 per cent of the gross earnings, plus an obligation to do street paving which under existing standards, absorbs approximately 5 per cent of the gross earnings. * * * This is a burden which a street railway company operating under a five cent fare, with universal transfers and paying present day rates of wages and prices for materials, cannot meet except possibly under unusual conditions which do not exist in this case."

In answer to this it may be pointed out that while some of the street railways do show a higher ratio of taxes to value than some of the other companies, the difference is not great enough to be destructive and is due to the fact that the stock and bond values are low on account of the financial difficulties of those companies, difficulties that originated in bad methods of finance. The statement is particularly unfair in that it adds to the taxes proper certain payments that are not taxes. The payments under the franchises are strictly rentals for the streets, public property leased to the companies, and the repairs are such as are commonly required from every tenant of leased property. But whatever the cause, the fact remains that every enterprise must pay taxes and should bear a burden as nearly as may be equal to that borne by the general run of taxpayers.

The limitations of the stock and bond valuation.

The stock and bond method of valuing public utilities gives a result which has a definite and a single meaning, and which must be used within the limits of that meaning. It should not be taken to mean something different, nor something more or less than it does mean. It expresses the value of the public utility as a unit and as a going concern, with reference, primarily, to its present earnings and to expected future earnings, and also to the character of its plant and of its management. It is the value as determined primarily by the investors who own its securities.

Other methods of valuation of public utilities will give different results, each of which has likewise its own peculiar significance. Other methods that have been used are based either on the capitalization of the net earnings or on some appraisement of the physical and franchise properties.

The use of round numbers.

The following tables set forth in detail the results of the investigation. It will be noted that the values are given in round numbers. The computations were carried out in detail down to the last dollar. But in tabulating the results the figures were taken to the nearest thousand, except in the case of very small companies where the dropping of the hundreds would have made a proportionately large difference in the result. It is held that to carry the hundreds, tens and units in estimates running into the millions lends only a specious appearance of accuracy to estimates that are not in their nature accurate in such detail. The use of round numbers does not, however, mean that the estimates were not made with all possible care.

Data on file.

Copies of the original reports, all the quotations collected, all other data used, the correspondence with tax agents and with the companies, all the original tabulations and computations made in preparing this part of the report are on file in the office of the Tax Commission.

RAILROAD AND STREET RAILWAY COMPANIES.

Stock and Bond Valuation of Properties in California and Ratio of Taxes Thereto.

(Excluding certain companies to which that method of valuation can not be applied.)

Company	Value	Tax	Ratio, per cent
Amador Central Railroad Co.	$392,000	$4,596 00	1.1724
Arcata and Mad River Railroad Co.	422,000	4,689 68	1.1113
Atchison, Topeka and Santa Fe Ry. Co.	80,547,000	1,015,395 14	1.2606
Bay Point and Clayton Railroad Co.	150,000	1,661 34	1.1075
Boca and Loyalton Railroad Co.	123,000	1,678 82	1.3648
Bucksport and Elk River Railroad Co.	40,000	466 56	1.1414
California Street Cable Railroad Co.†	1,300,000	23,562 52	1.8097
California Western Railroad and Navigation Co.	1,103,000	12,734 52	1.1545
Camino, Placerville and Lake Tahoe Railroad Co.	45,000	483 32	1.0740
Cement, Tolenas and Tidewater Railroad Co.	256,000	3,223 56	1.2592
Central California Traction Co.	1,105,000	14,661 78	1.3268
Death Valley Railroad Co.	366,000	5,289 80	1.4453
Diamond and Caldor Railway Co.	272,000	3,368 06	1.2382
Fresno Traction Co.†	808,000	11,960 38	1.4802
Holton Interurban Railway Co.	200,000	3,357 20	1.6786
Lake Tahoe Railway and Transportation Co.	150,000	2,071 44	1.3810
Los Angeles and San Diego Beach Ry. Co.†	375,000	4,085 50	1.0894
Los Angeles Railway Corporation†	24,495,000	319,272 76	1.3045
McCloud River Railroad Co.	1,200,000	15,473 12	1.2894
Monterey and Pacific Grove Railway Co.†	97,000	1,721 22	1.7744
Mt. Tamalpais and Muir Woods Railroad Co.	258,000	9,363 08	*3.6291
Nevada, California and Oregon Railway Co.	1,336,000	17,386 80	1.3014
Nevada County Narrow Gauge Railroad Co.	450,000	7,369 08	1.6375
Nevada County Traction Co.	120,000	1,426 30	1.1886
Northern Electric Railway Co.	3,960,000	41,532 58	1.0488
Northwestern Pacific Railroad Co.	17,367,000	209,081 96	1.2039
Oakland, Antioch and Eastern Railway Co.	1,800,000	31,558 70	1.7532
Pacific Coast Railway Co.	808,000	10,656 02	1.3188
Pacific Electric Railway Co.†	35,800,000	461,310 50	1.2886
Pajaro Valley Consolidated Railroad Co.	550,000	5,177 84	0.9414
Peninsular Railway Co.	1,600,000	15,033 22	0.9395
Petaluma and Santa Rosa Railway Co.	720,000	8,507 22	1.1816
Quincy Western Railway Co.	65,000	784 56	1.2070
Riverside, Rialto and Pacific Railroad Co.	212,000	3,590 72	1.6937
San Diego Electric Railway Co.†	4,400,000	54,536 78	1.2395
San Francisco, Napa and Calistoga Railway Co.	1,070,000	11,911 40	1.1132
San Francisco-Oakland Terminal Railways	18,085,000	242,372 86	1.3402
San Jose Railroads Co.†	1,560,000	17,664 86	1.1323
San Pedro, Los Angeles and Salt Lake Railroad Co.	13,290,000	190,175 22	1.4309
Santa Barbara Suburban Railway Co.†	310,000	4,095 52	1.3211
Santa Maria Valley Railroad Co.	340,000	4,819 68	1.4175
Sierra Railway Co.	1,490,000	17,021 24	1.1423
Southern Pacific Co.	255,876,000	3,313,633 24	1.2950
South San Francisco Railroad and Power Co.	90,000	1,208 36	1.3426
Stockton Electric Railroad Co.†	875,000	10,732 40	1.2265
Stockton Terminal and Eastern Railroad Co.	100,000	1,035 82	1.0358

RAILROAD AND STREET RAILWAY COMPANIES—Continued.

Company	Value	Tax	Ratio, per cent
Sugar Pine Railway Co.	$300,000	$2,761 48	0.9205
Sunset Railway Co.	1,300,000	15,653 38	1.2041
Tidewater Southern Railway Co.	330,000	4,377 78	1.3266
Tonopah and Tidewater Railroad Co.	1,504,000	18,097 58	1.2033
Union Traction Co.†	250,000	3,196 98	1.2787
United Railroads of San Francisco†	29,700,000	419,939 24	1.4139
Visalia Electric Railroad Co.	300,000	4,507 87	1.5026
Western Pacific Railway Co.†	8,064,000	154,514 18	1.9161
Yosemite Valley Railroad Co.	1,827,000	23,212 44	1.2705
Yreka Railroad Co.	67,000	1,109 66	1.6562
Totals	$519,620,000	$6,789,063 34	1.3065

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*On account of the exposition the receipts of this road in 1915 were three times the average of the five preceding years. Normally the tax ratio is about 1.37 per cent.

†Street railways.

GAS AND ELECTRIC COMPANIES.

Stock and Bond Valuation of Properties in California and Ratio of Taxes Thereto.

(Excluding certain companies to which that method of valuation can not be applied.)

Company	Value	Tax	Ratio, per cent
Alta District Gas Co.	$26,800	$362 66	1.3532
Alturas Electric Power Co.	73,000	767 26	1.0510
Amador Electric Light and Power Co.	137,000	1,851 92	1.3517
Bishop Light and Power Co.	48,000	704 44	1.4675
California Natural Gas Co.	1,005,000	12,427 14	1.2365
California Telephone and Light Co. (electric division)	354,000	3,816 08	1.0780
Calistoga Electric Co.	42,000	483 14	1.1503
Central California Gas Co.	486,000	4,457 28	0.9171
Central Natural Gas Co.	26,000	311 60	1.1984
Citrus Belt Gas Co.	398,000	5,986 60	1.5041
Coachella Valley Ice and Electric Co. (electric division)	28,000	370 56	1.3234
Coast Counties Gas and Electric Co.	1,690,000	17,598 66	1.0411
Coast Valleys Gas and Electric Co.	870,000	10,655 24	1.2247
Corona Gas and Electric Light Co.	96,000	1,279 44	1.3327
Economic Gas Co.	570,000	9,433 08	1.6549
Fort Bragg Electric Co.	100,000	1,460 06	1.4601
Fowler Gas Corporation	15,000	184 96	1.2330
Great Western Power Co.	16,887,000	183,578 58	1.0869
Half Moon Bay Light and Power Co.	66,000	824 72	1.2496
Hanford Gas and Power Co.	77,000	1,298 96	1.6869
Hemet-San Jacinto Gas Co.	45,000	530 26	1.1783
H. G. Lacey Co. (electric division)	300,000	4,273 72	1.4244
Holton Power Co.	675,000	10,114 94	1.4985
Imperial Valley Gas Co.	190,000	2,218 34	1.1675
Lassen Electric Co.	40,000	685 99	1.7148
Lompoc Light and Power Co.	56,000	653 48	1.1669
Long Beach Consolidated Gas Co.	950,000	12,757 20	1.3428
Los Angeles Gas and Electric Corporation	17,630,000	224,114 86	1.2355
Madera Gas Co.	35,000	540 68	1.5448
Mendocino Electric Co.	25,000	297 60	1.1904
Middle Yuba Hydroelectric Power Co.	90,000	1,089 56	1.2106
Midland Counties Public Service Corporation	800,000	10,187 40	1.2734
Midway Gas Co.	1,500,000	21,897 94	1.4598
Modesto Gas, Light, Coal and Coke Co.	162,000	2,201 20	1.3587
Mt. Konocti Light and Power Co.	70,000	799 33	1.1419
Mt. Whitney Power and Electric Co.*	3,470,000	43,947 68	1.2665
Napa Valley Electric Co.	96,000	1,366 28	1.4232
Needles Gas and Electric Co. (electric division)	131,000	1,764 95	1.2732
Northern California Power Co., Cons.	3,700,000	37,301 50	1.0081
Oakdale Gas Co.	50,000	572 12	1.1442
Oceanside Electric and Gas Co.	27,000	372 92	1.3811
Ontario Power Co.	465,000	5,261 38	1.1315
Ontario-Upland Gas Co.	115,000	1,598 78	1.3902
Oro Electric Corporation	611,000	7,107 68	1.1633
Oro Water, Light and Power Co.	200,000	3,420 38	1.7102
Pacific Gas and Electric Co.	91,040,000	934,094 86	1.0265
Pacific Light and Power Corporation	15,650,000	154,370 40	0.9864
Palo Alto Gas Co.	208,000	2,816 30	1.3532
Rialto Light, Power and Water Co.	27,500	388 08	1.4112
Sacramento Gas Co.	500,000	6,622 68	1.3245
San Diego Consolidated Gas and Electric Co.	6,717,000	80,762 56	1.2023

GAS AND ELECTRIC COMPANIES—Continued.

Company	Value	Tax	Ratio, per cent
San Joaquin Light and Power Co.†	$7,862,000	$91,691 96	1.1663
Santa Barbara Gas and Electric Co.	1,363,000	16,867 50	1.2375
Santa Maria Gas and Power Co.	189,000	2,473 44	1.3087
Sierra and San Francisco Power Co.	6,225,000	64,018 24	1.0284
Snow Mountain Water and Power Co.	600.000	7,068 20	1.1780
Southern California Edison Co.	25,174,000	248,295 00	0.9863
Southern California Gas Co.	3,250,000	46,307 22	1.4248
Southern Counties Gas Co. of California	1,020,000	12,662 46	1.2414
Southern Sierras Power Co.‡	2,178,000	27,464 18	1.2610
Truckee Electric Light and Power Co.	45,000	534 78	1.1884
Tuolumne Transmission Co.	25,000	361 04	1.4441
Turlock Gas Co.	51,000	723 04	1.4177
Ukiah Gas Co.	45,000	515 48	1.1455
United Light, Fuel and Power Co.	220,000	2,744 14	1.2473
Universal Electric and Gas Co.	500,000	6,659 76	1.3319
Vallejo Electric Light and Power Co.	320,000	4,352 30	1.3601
Ventura County Power Co.	773,000	10,381 68	1.3430
Weaverville Electric Co.	22,000	250 58	1.1390
West Coast Gas Co.	120,000	1,447 50	1.2062
Western States Gas and Electric Co.	6,350,000	61,792 76	0.9731
Totals	$224,902,300	$2,438,576 64	1.0838

*Includes Tulare County Power Company.
†Includes Bakersfield and Kern Electric Railway.
‡Includes California business of the Nevada-California Power Company.

TELEPHONE AND TELEGRAPH COMPANIES.

Stock and Bond Valuation of Properties in California and Ratio of Taxes Thereto.

(Excluding certain companies to which that method of valuation can not be applied.)

Company	Value	Tax	Ratio, per cent
Calaveras Telephone Co.	$8,000	$99 66	1.2457
California Telephone and Light Co. (telephone division)	220,000	2,255 18	1.0250
Central Telephone Co.	15,000	180 04	1.2000
Chetco Southern Telephone Co.	5,000	72 78	1.4556
Coachella Valley Home Telephone and Telegraph Co.	10,000	135 20	1.3520
Colfax Telephone Exchange	7,700	86 40	1.1221
Colusa County Telephone Co.	90,000	1,307 16	1.4524
Consolidated Utilities Co.	58,400	718 36	1.2300
Corona Union Telephone and Telegraph Co.	58,000	666 46	1.1490
Del Norte Peoples Telephone Co.	18,000	253 56	1.4086
Dos Palos Telephone Co.	10,000	138 16	1.3816
Downey Home Telephone and Telegraph Co.	40,000	578 72	1.4468
Ducor-California Hot Springs Telephone and Telegraph Co.	4,500	64 20	1.4266
Eel River and Southern Telephone Co.	25,000	357 02	1.4280
Empire Telephone Co.	3,000	42 12	1.4040
Fowler Independent Telephone Co.	27,700	329 48	1.1894
Gilroy Telephone Co.	33,700	393 80	1.1685
Glenn County Telephone Co. (The)	50,000	633 30	1.2666
Guglielmetti Rural Telephone Co.	6,000	69 36	1.1560
Happy Valley Telephone Co.	2,400	31 12	1.2966
Herbert Bass Telephone Co.	6,400	88 32	1.3800
Home Telephone and Telegraph Co. (Los Angeles)	5,943,000	90,340 28	1.5201
Home Telephone Company of Covina	151,000	1,755 10	1.1622
Home Telephone and Telegraph Company of Pasadena	1,025,000	12,998 10	1.2681
Home Telephone and Telegraph Company of Santa Barbara	428,000	5,116 70	1.1955
Imperial Telephone Co.	167,000	2,798 66	1.6758
Interstate Telegraph Co.	87,700	1,070 42	1.2199
Kerman Telephone Co.	8,400	117 28	1.3961
Kern Mutual Telephone Co.	170,000	2,333 18	1.3723
Lindsay Home Telephone and Telegraph Co.	25,000	354 94	1.4197
Los Gatos Telephone Co.	42,000	585 72	1.3928
Lost Hills Telephone and Telegraph Co.	11,000	129 12	1.1738
Marconi Wireless Telegraph Company of America	25,800	328 88	1.2747
Monrovia Telephone and Telegraph Co.	72,000	1,002 10	1.3918
Nevada, California and Oregon Telephone and Telegraph Co.	82,000	1,005 18	1.2258
New Freeport Telephone and Telegraph Co.	72,000	1,011 36	1.4046
Northern Trinity Telephone and Telegraph Co.	2,000	24 94	1.2470
Ontario and Upland Telephone Co.	140,000	1,818 90	1.2991
Oxnard Home Telephone Co.	75,000	893 56	1.1914
The Pacific Telephone and Telegraph Co.	45,980,000	633,294 60	1.3767
Placer County Telephone Co.	5,000	67 18	1.3434
Pomona Valley Telephone and Telegraph Union	200,000	3,192 86	1.5964
Redondo Home Telephone Co.	26,000	321 94	1.2382
Reedley Telephone Co.	22,000	337 74	1.5351
Riverside Home Telephone and Telegraph Co.	82,000	1,052 30	1.2833

TELEPHONE AND TELEGRAPH COMPANIES—Continued.

Company	Value	Tax	Ratio. per cent
Roseville Telephone Co.	$29,500	$398 20	1.3498
San Antonio Home Telephone Co.	3,450	47 40	1.3739
San Diego Home Telephone Co.	370,000	5,564 64	1.5039
San Fernando Telephone and Telegraph Co.	26,000	365 44	1.4055
San Fernando Valley Home Telephone Co.	59,000	720 92	1.2219
Santa Monica Bay Home Telephone Co.	166,500	2,212 22	1.3281
Santa Paula Home Telephone Co.	40,000	539 94	1.3498
Sierra Madre Telephone and Telegraph Co.	26,000	382 32	1.4704
The Siskiyou Telephone Co.	19,000	260 26	1.3684
Smeltzer Home Telephone and Telegraph Co.	21,000	236 94	1.1282
Southwestern Home Telephone Co.	300,000	3,583 16	1.1944
The Tulare Home Telephone and Telegraph Co.	48,000	766 98	1.5978
Union Home Telephone and Telegraph Corporation	538,000	7,074 26	1.3149
United States Long Distance Telephone and Telegraph Co.	1,160,000	14,023 18	1.2089
Valley Telephone Co.	19,600	256 70	1.3097
The Western Union Telegraph Co.	2,212,000	39,904 60	1.8040
Whittier Home Telephone and Telegraph Co.	127,000	1,891 04	1.4890
Willits Telephone and Telegraph Co.	8,500	111 28	1.3091
Totals	$60,714,250	$848,790 92	1.3983

EXPRESS COMPANIES.

Stock and Bond Valuation of Properties in California and Ratio of Taxes Thereto.

(Excluding certain companies to which that method of valuation can not be applied.)

Company	Value	Tax	Ratio. per cent
American Express Co.	$132,000	$3,012 84	2.2824
Wells Fargo & Co.	3,573,000	80,941 44	2.2654
Totals	$3,705,000	$83,954 28	2.2660

CAR COMPANIES.

Stock and Bond Valuation of Properties in California and Ratio of Taxes Thereto.

(Excluding certain companies to which that method of valuation can not be applied.)

Company	Value	Tax	Ratio. per cent
Pacific Fruit Express	$1,825,000	$29,352 80	1.6090
Pullman Company	9,840,000	121,942 22	1.2392
Totals	$11,665,000	$151,295 02	1.2970

The case of the short line railroads.

Unquestionably the gross receipt tax falls with considerable inequity between the railroads in the same manner as it does between other public utilities. As a result of the investigation by this commission, the range of the ratio or burden of tax on railroads is from .9205 up to 1.9161. In one exceptional case the ratio ran up to 3.6291. According to our figures the tax uniformly falls heavier upon the smaller or short line railroads. This is but one of the inequalities which develop under the present system of taxation and which continue because of the fact that the detail of the tax system is embodied in the constitution of the state and can not be changed by legislative action.

We give an excerpt from a statement made by Mr. D. M. Swobe, representing an organization of many of the short line railroads of the state:

> *State Tax Commission,*
> *Sacramento, Cal.*
>
> GENTLEMEN:
>
> "It is a well known fact and recognized by many of the railroad commissions in the western states that the development of the interior of the country falls to the lot of the short line railroads. Trunk lines follow the course of least resistance between large producing and large consuming centers but the short lines are the pioneers of opening up the sparsely settled country far into the interior and therefore they have no expensive terminal facilities which are exempt from local taxation.
>
> "The short lines operate, as I have said, through a sparsely settled country producing a small tonnage, and generally through a barren or mountainous country where operating expenses are extremely high, and due to their remoteness from the market their necessary supplies are much higher than those of a trunk line serving the large markets by their own rails; therefore the rates on the short lines, due to the extremely heavy operating cost and small volume of traffic, are of necessity much higher than those of the trunk lines. Their net earnings after deduction of their operating cost are extremely low and in a majority of cases in California, in the "red." Many of our short lines were originally plant facilities and have become common carriers in order to build up and develop the country they serve. There is very little inducement under the present method of taxation for any plant facility to become a common carrier, for if they are to meet their operating cost in any way they must of necessity have high rates, and therefore I believe it is clearly shown that a tax on the gross earnings of such lines works a great injustice. If this tax could be made to apply on the net earnings in case of the short lines, or a percentage of their gross much less than the present rate, it would be no more than equitable. I am satisfied that this principle would be admitted by any one familiar with the present basis of taxation of the short lines."
>
> Respectfully yours,
>
> D. M. SWOBE.

Double taxation of public utilities.

In connection with the light, heat and power companies there has been drawn to our attention a matter of what is claimed to be double taxation. Simply stated, it is that the power generated by the developing company is sold to a second company, the state getting a tax upon the gross amount of the sale. The same power is then sold by the second company to a third party, and the state gets a tax upon the gross, which includes a charge for the original price of the power received from the first sale plus the gross profit made by the second company in handling the product the second time. This action, in some instances, takes place three or four times, the same power or property being used in the different transactions.

The result of this is demonstrated by using the example of a street railway company, which has a property value of $100,000,000, from which it realizes gross receipts amounting to $20,000,000. The state tax upon the $20,000,000 at the present rate would be $1,050,000. Supposing, then, that the railway company disposes of its generating property, worth $20,000,000, and purchases its power from the power company, and that the street railway company still receives gross receipts amounting to $20,000,000 from a property value of $80,000,000, it would still be paying a $1,050,000 state tax, and the power company which sells to it and had purchased the $20,000,000 property, would be paying a tax on the gross receipts from the property which originally belonged to the street railway company, amounting, we will say, to $105,000, on the basis of $2,000,000 gross receipts. We would then have a condition where the original property, worth $100,000,000, would, in the one instance, bear a tax of $1,050,000, and in the second instance the identical property bearing a tax of $1,155,000. It is claimed, and with some justice, we believe, that this would bring a double taxation of property value.

This is not exactly identical to other cases of double taxation which are provided for, as in the case of the railroads, where deduction is made from the gross receipts for subsidiary companies, but it is practically identical in its effect.

It would seem reasonable, therefore, that the company buying power under these conditions should be allowed to deduct the cost of that power from its total receipts in establishing the taxable gross receipts.

Banks make plea for lower rate.

We append to this discussion a statement made by the tax committee of the California Bankers Association relative to their contention regarding the rate of taxation on banks.

The position that the banks take is that in paying at the rate of 1.2 per cent on their capital, surplus and undivided profits they are paying considerably more than their fair share of the public burden. They maintain, and rightly, we believe, that the deduction of simply the assessed value from the total of the capital, surplus and undivided profits leaves an element of double taxation in that other property is not taxed at its full cash value, and the deduction of a lesser amount than the full cash value of the property which is taxed locally leaves a difference between the assessed value and the true value of bank real estate which is assessed twice inasmuch as the rate established by the constitution is fixed on the basis of an assessment at full value.

The admission, however, on the part of this commission of this inequality does not alter the findings of the commission that the present rate applied to banks is proper and just. All, or practically all, of the property of banks lies within incorporated cities. The burden of taxation within the cities is considerably more than the burden of taxation outside. According to figures compiled by this commission the burden of tax inside of incorporated cities is approximately 1.44 per cent, or $1.44 on the $100 of value. The figures submitted by the committee of the California Bankers Association, which we believe are substantially correct, show that the average rate of tax paid by the banks to the state, including the discrepancies above mentioned, is $1.426 on the $100 of value. This being the case, we can not see where injury is being done to the banks by the present rate which is applied to their total capital, surplus and undivided profits.

Report of committee of Bankers Association.

Herewith is presented the argument on the taxation of banks prepared by the taxation committee of the California Bankers Association as submitted to this commission:

To the Honorable State Tax Commission,
Sacramento, California.

GENTLEMEN:

It is taken to be the purpose of your commission to recommend, and of the legislature to enact, those rates of taxation on the properties reserved by the state under Constitutional Amendment No. 1 which will equalize as nearly as possible the whole public burden, state and local.

To this end, you have made an exhaustive examination into the conditions of local taxation in order to determine the average, or basic ratio, of taxes to the true value of common forms of property, as the measure for an equitable adjustment of state tax rates. It is your conclusion that the average ratio of taxes to true value in the state at large is approximately 1.25 per cent, or $1.25 on each $100. This figure being established, the tax rates controlled by the legislature are to be fixed so that the properties taxed by the state, in whole or in part, shall pay at approximately the same ratio.

For the purposes of this demonstration, the banks assume that the findings of the commission respecting the basic rate are correct, and that the common forms of property throughout the state are now paying at the rate of $1.25 on each $100 of true value.

In contrast to this figure, the banks are able to show that they are now paying in state and local taxes and in contributions to the support of the State Banking Department, the equivalent of $1.426 on each $100 of accurately-measured true value—accurately measured, because at all times the true taxable value of a bank can be found by adding together the three items of capital, surplus and undivided profits as carried on its books.

This figure of $1.426, the detail of which is shown in the accompanying table (Chart I) and in the more complete data filed with your commission, is based on the taxes actually paid by 615 banks, with a combined capital, surplus and undivided profits of $191,190,997, during the fiscal year 1915-1916. Greatest care was exercised in collecting and compiling the statistics from which the average rate was computed.

The taxes of every bank in the state, with the exception of 80 state banks (sixty-eight of which were inadvertently omitted from the list of banks from which returns were requested) and seven national banks, are included in the calculations. Although it is not believed the figures from these missing banks will affect the result, they will be assembled as soon as possible and submitted to your Honorable Commission.

In order to explain clearly how it comes about that the banks are paying in state and local taxes the equivalent of $1.426 on each $100, there is set down here a brief description of the plan of bank taxation in California, and how that plan works out in practice.

It is provided in the constitution (Article XIII, Section 14) that there shall be levied annually by the state a tax of 1.2 per cent. on the book value, *i. e.*, the capital, surplus and undivided profits, of bank stock, *less* the assessed value of any real estate owned by the bank, which real estate is taxed at the local rate for the benefit of the political subdivision wherein it is situated.

Thus, the constitution recognizes that the entire value of a bank is the sum of its capital, surplus and undivided profits, and it seeks to prevent double taxation by providing that a part of this value shall be subject to taxation by the state and a part shall be subject to taxation by local subdivisions.

Although the constitution evidently intends that the whole value shall be taxed but once, and in the same proportion as other forms of property, this intention is not given effect, owing to the universal practice of assessing the real estate at one-half or less of its true cash value, or in other words, at one-half or less of the value at which it normally stands on the books of the bank which owns it. The result is that the banks are taxed at the high local rates on their real estate, and then are allowed to deduct only the assessed value, instead of the true value, in computing the taxable base to which the state rate applies.

By way of illustration, assume a bank with a total capital, surplus and undivided profits amounting to $1,000,000, which owns real estate worth $196,000 and carried on its books at that amount (following the *average* proportion of real estate to total capital, surplus and undivided profits of the banks of California).

If this real estate were assessed for local taxation at its true cash value, as the law requires (Section 3627 Political Code), and assuming of course that all other real estate was assessed on a full cash value basis, this typical bank would pay a tax on its real estate into the local treasury, and after deducting that amount of its book value represented by such locally taxed real estate, it would pay on the remainder, or $804,000, a tax to the state of 1.2 per cent.

In actual practice, however, the real estate of this typical bank is not assessed at its full cash value, as the law requires, but at an average of 46 per cent thereof, or $90,160. It is obvious that the assessment of its real estate at a fraction of true value, when universally practiced, does not reduce the amount of the local tax which a bank pays, but it does have this effect: In computing the taxable base to which the state rate applies, only 46 per cent of the full value of the real estate can be deducted from the capital, surplus and undivided profits, leaving $909,840 subject to the state tax of 1.2 per cent.

As a result, the total taxes of this typical bank are increased by $1,270, or 1.2 per cent. of the difference between the true value and the assessed value of its real estate. This *margin* between the assessed and the true value of real estate owned by banks is taxed twice—in violation of the spirit, if not of the letter, of the constitution.

When to the double taxation of this margin, as shown in the example above, there is added the assessments levied for the support of the State Banking Department, the result is a burden in taxes, which, divided by the combined capital, surplus and undivided profits of all of the banks whose reports are included in the accompanying summary, results in a rate of $1.426 on each $100 of the true book value.

Bearing in mind the foregoing explanation of the plan of bank taxation, it is possible to compute from the accompanying summaries the several elements which make up the total rate of $1,426 paid by the banks in the year 1915–1916. The combined capital, surplus and undivided profits of the 615 banks whose reports are included here amounted to $191,190,997; their real estate was assessed at $17,320,783 and was carried on their books at $37,453,177; they paid in state taxes $2,109,410; in local taxes, $535,849, and to the State Banking Department $80,901, making a total tax bill of $2,726,160. (Charts I and II.)

The rate of $1.426 on each $100 of value, paid by the banks in 1915–1916, was made up of the following elements:

	Amount.	Rate.
(1) The *normal* state tax of 1.2 per cent on the combined capital, surplus and undivided profits, after deducting the true value, instead of the assessed value, of local real estate	$1,884,853 00	.986
(2) The additional tax actually paid to the state, by reason of the fact that the assessed value, and not the true value, of real estate was deducted from capital, surplus and undivided profits	224,557 00	.118
(3) The *normal* local real estate tax, at the *then* average ratio of 1.22 per cent of true value	456,928 00	.239
(4) The balance of the local real estate tax, accounted for by the fact that most banks are located in incorporated cities and therefore pay higher rates	78,921 00	.041
(5) Contributions to support the State Banking Department	80,901 00	.042
Total tax	$2,726,160 00	
	=	1,426
Combined capital, surplus and profits	$191,190,997 00	

Of the five items listed above, numbers 1, 3 and 4 are proper, being within the intent and purpose of the constitution. They express the theory of the California system of bank taxation, which contemplates the payment of a local tax on that part of the value of a bank which is represented by real estate, and a state tax at the average rate on the remainder. The rate then paid by the banks would be $1.266 on each $100, or the sum of the three items.

Item No. 2 is improper and not within the intent of the constitution. If the full value of bank real estate were deducted from the capital, surplus and undivided profits in computing the state tax, instead of the assessed value, the bank would be meeting their full obligations, although paying $225,000 a year less than they are now paying.

Item No. 5 is improper, because the constitution specifically provides that aside from the local taxes on their real estate, the state tax on banks ''shall be in lieu of all other taxes and licenses, state, county and municipal.''

It has sometimes been contended that the contributions for the support of the banking department are not taxes, but *fees*. This may hold true in part; that is, whatever part of the contribution from any bank goes to pay the cost of the periodical examinations made by the department of the affairs of that bank, is, in fact, in the nature of a fee. All the remainder is nothing but a tax.

The distinction between a *tax* and a *fee* is drawn by Prof. Seligman in his "Essays on Taxation," page 432, as follows:

> "A *tax* is a compulsory contribution from the person to the government to defray the expenses incurred in the common interest of all, without reference to special benefits conferred."
>
> "A *fee* is a payment to defray the cost of each recurring service undertaken by the government primarily in the public interest, but conferring a measurable special advantage on the fee-payer."

If the banks were charged only with the cost of the examinations made by the banking department, each bank paying the cost of its own examinations, the charge would be a fee. Such charges would be considerably below the contributions now levied upon the banks for the support of the banking department. "The overhead" expense of that department should be borne by the *whole* public, just as the expense of the railroad commission is borne, by appropriation from the state's general fund.

Before the legislative session of 1915, the banks paid taxes to the state at the rate of 1 per cent, instead of 1.2 per cent. Had the increase at that time been from 1 per cent to 1.05 per cent, substantial justice would have been done, for in that event the total rate, as computed in the analysis above, would have been $1.29 on each $100.

Because the rate was raised to 1.2 per cent, instead of 1.05 per cent, the banks have paid in the past two years approximately, $550,000 in excess of their proportionate share of the public burden.

It is with no desire to escape any part of their fair proportion of taxes that the banks lay these facts before your honorable commission. They are entirely in accord with the theory of the existing system of bank taxation, but would make it plain that in practice the system is in need of some adjustment in order to prevent injustice.

The constitution provides that the rates fixed therein for the taxation of properties reserved by the state may be changed by the legislature. That provision was inserted in order that the legislature might continue, as in the past, to follow the theory of "taxation in proportion to value" by changing the rates whenever the taxes on any class of property ceased to be in the same proportion to the value thereof as the taxes on all other forms of property from which the biennial average is taken. The constitution does not enjoin uniformity between the subjects taxed exclusively by the state. It does not, in fact, require that property taxed by the state shall pay in the same proportion as property taxed locally. The legislature is left free to make any adjustments of state tax rates which it is proper to make in distributing equitably the *whole* burden of taxation, state and local.

The legislature can, therefore, take into account the 46 per cent assessment of the real estate of the banks in determining the rate of taxation upon the remaining taxable value of bank stock for state purposes. The legislature has power to provide, in the case of the banks as well as in all other cases, that the *aggregate* taxes shall be in proportion to value, and at the same rate as the taxes on all other forms of property.

The present method of taxing banks was first put into effect in 1911. The total taxes collected by the state from the banks each year have been as follows:

1911	$1,638,646 00	(Rate 1 per cent)
1912	1,703,304 00	(Rate 1 per cent)
1913	1,778,319 00	(Rate 1 per cent)
1914	1,831,745 00	(Rate 1 per cent)
1915	2,226,374 00	(Rate 1.2 per cent)
1916	2,235,923 00	(Rate 1.2 per cent)

This shows a gross increase in five years in taxes paid to the state of 36.5 per cent. The *net* increase can be ascertained by considering the amount of new capital that has entered the business of banking in this time. The relation between the increase in banking capital and the increase in taxes, is shown as follows:

1. National Banks.

	1911	1916	Increase
Total capital and surplus	$77,241,000 00	$87,350,000 00	13.1
Taxes paid to the state	835,688 00	1,169,719 00	40.0

2. State Banks.

Total capital and surplus	$82,499,700 00	$93,528,200 00	13.3
Taxes paid to the state	802,958 00	1,066,204 00	32.7

When the present system of bank taxation was first proposed, in 1905, it was pointed out by the Commission on Revenue and Taxation that the banks of California were well able to pay a tax of 1 per cent on book value, less real estate, by reason of the abnormally high earnings of national banks in this state. Figures were quoted from the reports of the United States Comptroller of the Currency showing that during the years between 1900 and 1905, national banks in California were earning, on an average, about 11 or 12 per cent per annum, while banks elsewhere in the country were earning but 6 or 8 per cent.

To determine whether this condition still obtains, the comptroller's reports for the fiscal years ending June 30, 1910 and June 30, 1915 were consulted, and the following figures obtained:

National Bank Statistics, from United States Comptroller's Reports.

	Year ending June 30, 1910	Year ending June 30, 1915
Number of national banks in California	172	261
Combined capital and surplus of same	$60,351,949 00	$86,358,528 00
Net earnings for the year	6,401,530 00	6,018,691 00
Ratio of net earnings to capital and surplus	10.60%	6.97%
Ratio of net to capital and surplus, San Francisco banks	9.05%	5.27%

The following figures show how the proportion of earnings of California banks for the fiscal year ending June 30, 1915, compared with the proportion of earnings of *all* national banks, etc.:

Year Ending June 30, 1915.

Average ratio for all national banks in United States	7.08 per cent
Ratio for California banks only	6.97 per cent
Ratio for banks in New York state	7.26 per cent
Ratio for banks in Ohio	7.12 per cent
Average ratio, all banks in Pacific coast states	7.23 per cent

The following figures show how the earnings of San Francisco national banks compare with the earnings of national banks in other large cities:

Year Ending June 30, 1915.

Ratio for San Francisco banks	5.27 per cent
Ratio for New York city banks	7.77 per cent
Ratio for Boston banks	5.88 per cent
Ratio for Chicago banks	8.21 per cent

NOTE.—These figures taken from report of Comptroller of the Currency for 1910, pages 322–329; and from report of Comptroller of the Currency for 1915, Vol. II, pages 276–279.

The case of the banks is here presented in full, free of assumptions and, in the belief of this committee, free of errors. The accompanying summaries, taken with the foregoing explanation, disclose exactly how and to what extent the banks are paying taxes in excess of those paid by the common forms of property throughout the state. They show that by reason of the 20 per cent increase in the state rate two years ago, the banks have since been paying approximately $275,000 a year more than their fair share of the public burden; in other words, that the increase in 1915 should have been only 5 per cent, instead of 20 per cent.

These facts are presented to your honorable commission, in order that you may be advised of the true conditions of bank taxation when you draft your recommendations to the legislature of 1917.

Respectfully submitted,

JOHN S. DRUM,
Vice Chairman, Taxation Committee,
California Bankers Association.

CHART I.

Rate of Taxes Paid by Banks on Basis of Capital, Surplus and Undivided Profits, 1915-1916.

National banks	No. of banks	Capital, surplus and undivided profits	Assessed value of real estate	State tax	Taxes on real estate	Paid State Banking Department	Total tax	Rate	Rate, not including paid State Banking Department
National banks—									
San Francisco	9	$50,487,504	$2,087,329	$580,301	$44,711	----------	$625,012	1.238	----------
Other northern cities	19	11,556,341	1,379,355	127,841	48,489	----------	176,330	1.526	----------
All other northern	102	10,501,672	867,858	116,379	34,775	----------	151,154	1.439	----------
Total northern	130	$72,545,517	$4,334,542	$824,521	$127,975	----------	$952,496	1.313	----------
Los Angeles	9	$13,792,211	$120,447	$162,701	$6,304	----------	$169,005	1.225	----------
Other southern cities	23	6,527,215	314,045	76,638	13,484	----------	90,122	1.382	----------
All other southern	80	6,210,017	494,090	70,133	18,763	----------	88,896	1.431	----------
Total southern	112	$26,529,443	$928,582	$309,472	$38,551	----------	$348,023	1.311	----------
Total national	242	$99,074,960	$5,263,124	$1,133,993	$166,526	----------	$1,300,519	1.312	----------
State banks—									
San Francisco	22	$28,831,840	$6,110,745	$277,872	$142,990	$24,930	$445,792	1.546	1.459
Other northern cities	32	15,978,979	2,770,637	161,772	105,397	14,388	281,557	1.762	1.672
All other northern	203	23,387,135	1,651,073	262,192	62,189	20,006	344,387	1.475	1.387
Total northern	257	$68,197,954	$10,532,455	$701,836	$310,576	$59,324	$1,071,736	1.571	1.484
Los Angeles	12	$13,826,396	$937,420	$158,488	$33,028	$12,180	$203,696	1.470	1.385
Other southern cities	23	5,540,903	263,986	64,167	13,412	5,334	82,913	1.496	1.400
All other southern	81	4,550,784	323,798	50,926	12,307	4,063	67,296	1.481	1.391
Total southern	116	$23,918,083	$1,525,204	$273,581	$58,847	$21,577	$353,905	1.481	1.390
Total state	373	$92,116,037	$12,057,659	$975,417	$369,423	$80,901	$1,425,741	1.518	1.460
Total all banks	615	$191,190,997	$17,320,783	$2,109,410	$535,949	$80,901	$2,726,260	1.426	1.384

CHART II.

Relation of Assessed Value to Book Value of Bank Real Estate.

	No. of banks	Assessed value of real estate	Book value of real estate
National banks—			
San Francisco	9	$2,087,329	$4,754,831
Other northern cities	19	1,379,355	1,950,915
All other northern	102	867,858	1,953,184
Total northern	130	$4,334,542	$8,658,930
Los Angeles	9	$120,447	$485,032
Other southern cities	23	314,045	598,766
All other southern	80	494,090	1,151,111
Total southern	112	$928,582	$2,234,909
Total national	242	$5,263,124	$10,893,839
State banks—			
San Francisco	22	$6,110,745	$12,725,654
Other northern cities	32	2,770,637	5,395,175
All other northern	203	1,651,073	4,529,947
Total northern	257	$10,532,455	$22,650,776
Los Angeles	12	$937,420	$2,247,722
Other southern cities	23	263,986	719,369
All other southern	81	323,798	940,471
Total southern	116	$1,525,204	$3,907,562
Total state	373	$12,057,659	$26,558,338
Total all banks	615	$17,320,783	$37,452,177

ADJUSTMENT OF RATES ON PUBLIC UTILITIES.

As a result of the investigation made by this commission the average burden of tax on the $100 of value on corporations is shown to be approximately the same as the average burden on general property. When we take into consideration that the public service and other corporations separated for state taxation are relieved of the license tax which they would otherwise bear, the comparison is made on a basis of an average of $1.2566 for utilities and an average of $1.2219 for general property. The actual figures show for the present year a heavier burden on utilities than on other property by $0.0347 on the $100 of value.

On this showing it might be argued by the utilities that their rates should be lowered. There are sufficient reasons why this should not be done.

In 1913 it was found by investigation that the average burden of tax on general property was $1.1386 and that on public utilities $0.8789. The rate for general property was subsequently reduced to $1.102. This means that for the years 1911 and 1912 general property was paying $0.2231 on the $100 of value more than the utilities.

In 1915 it was found by investigation that general property had been paying at the rate of $1.2183, while utility rates remained at $1.102.

This means that for the years 1913 and 1914 general property was paying $0.1163 on the $100 of value more than the utilities.

The heavier burden of $0.0347 on utilities for 1915 and 1916 will in no wise offset the heavier burden on general property for the four years previous.

It is, therefore, the findings of this commission that the average rates upon the gross receipts of the separated corporations are not too high. There is, however, some variance as between certain of the groups of corporations under the constitutional classification. The tax seems to be particularly heavy upon express companies and light on gas and electric companies.

LOSS TO COUNTIES BY SEPARATION.

Much dissension has arisen during the past three sessions of the legislature regarding the proper method of determining the loss occasioned to several of the counties in the state because of the withdrawal of railroad property from local taxation.

San Bernardino County has been the greatest sufferer because of the withdrawal of this class of property and at each session of the legislature has been foremost in asking for additional compensation.

The method originally used in calculating San Bernardino's loss seemed to indicate that the state was returning a sufficient amount to recompense the county. This commission, however, was directed by the statute passed at the 1915 session to go into the matter of this refund and make report thereon.

San Bernardino County was the first county taken up for consideration, and a proper method of establishing the loss was worked out. Up to the time of sending this report to print San Bernardino County was the only county upon which the calculations were finished. Using the method established, it has been determined that San Bernardino County for the five years since 1911 is entitled to an additional reimbursement. This commission recommends that appropriation be made to adjust this matter with the county.

Method of determining loss of county revenues.

The constitutional provision regarding the repayment of loss reads as follows:

> Until the year 1918 the state shall reimburse any and all counties which sustain loss of revenue by the withdrawal of railroad property from county taxation for the net loss in county revenue occasioned by the withdrawal of railroad property from county taxation. The legislature shall provide for reimbursement from the general funds of any county to districts therein where loss is occasioned in such districts by the withdrawal from local taxation of property taxed for state purposes only.

Under this, the county reimburses to the districts the losses sustained in special taxes on all of the withdrawn property known as operative property. The state reimburses to the counties on withdrawn railroad operative property only. The withdrawn property on which the state does not pay loss is known as nonrailroad operative.

There can be no question, we believe, that the gross loss of revenue sustained by the county is the amount of taxes lost by the withdrawal of railroad property from general county assessment, plus the amount of taxes lost from general county revenue by the reimbursement to districts of losses of special taxes.

The gross gain to the county is the amount of taxes which would have been levied for state purposes against the property which is taxed only for local purposes. This is known as nonoperative property.

The net loss is the amount obtained by subtracting the gross gain from the gross loss.

Under the constitution, the counties that make a net gain because of the change get the full benefit of that gain. They do not, as might equitably be expected, divide their gain with the counties that have a net loss. The state assumes all of the loss and, therefore, stands in the place of the rest of the counties that gain. If it were a matter of settlement between counties, and the property in one county was assessed at 30 per cent of its true value, and in another at 50 per cent of its true value, then before a true loss and gain could be established the counties must be brought to the same relative value footing, or, in other words, equalization must take place. If this would be true as between counties, so is it true as between the state and any county.

For the purpose of equalization we have used the percentage obtained by a comparison of the 1915 assessment figures with appraisements made in 1916 by this commission. This gives some advantage to the county for the back years. The percentage of assessed to true value was found for the state to be $41.991. This, divided by the percentage of assessed to true value in the county, will give the multiple to be applied to the property assessed by the county to equalize it with the state as a whole.

Under the old method of taxation the state always allowed 5 per cent for delinquency on the total assessed value, while the counties made such allowance as they desired. In this example we have figured 5 per cent delinquency for both county and state.

In order to determine the total loss and gain it is necessary to find out what rates under the old system would have been necessary to raise the same amounts of taxes as have been used for state and county purposes. The actual county rates inside and outside can not be used because when applied to the value of all property they would result in a much greater amount of tax than was actually raised. So it is necessary to establish what the rates would have been, which are called, for convenience, "constructive rates."

For the county it is necessary to establish two rates, the constructive county inside rate and the total constructive county rate outside. The constructive county inside rate is obtained by dividing the amount of taxes necessary for general county purposes by the total assessed value of the county. The total constructive county rate outside is obtained by adding to the constructive inside rate the rate obtained by dividing the road and other general outside taxes by the outside assessed value.

For the state the constructive rate is found by dividing the amount of taxes which it would have been necessary to levy against general property by the assessed value of the state.

In arriving at the amount of county taxes to be used in finding the county constructive rates we have taken the total amount of county taxes charged, to which we have added the amount of refund received from the state on account of bonded indebtedness prior to 1910 and railroad loss refund, for the reason that these amounts would have been raised by taxation. From this we have deducted the amount of taxes refunded by the county to the several districts on account of special taxes because this amount would not have been raised by county taxation under the old system and constitutes a part of the actual loss to county revenues to be considered later.

From the total county taxes so determined we deduct the road and other general outside taxes, leaving the net amount of general county taxes.

In arriving at the amount of state taxes to be used in finding the constructive state rate we take the total corporation and franchise taxes and deduct therefrom (1) $400,000, representing the average amount which would have been obtained under the old law from insurance companies, and (2) the amount of refunds on account of railroad property loss and refunds on bonds prior to 1910 which would not have been raised for state purposes. This leaves the net amount of state taxes which would have been raised by an ad valorem levy.

The county, under the constitution, makes refund to districts of loss sustained on the total withdrawn or operative property. The state can refund only on loss from withdrawn railroad property. Therefore, to get the amount of loss to county revenue from special taxes which should be considered by the state we find the percentage of nonrailroad operative property as compared to the total operative property, and deduct that percentage from the total county special tax loss.

Having determined the different factors necessary in the problem, the loss and gain is figured as follows:

The constructive county inside rate is applied to the assessed value of railroad property inside, giving the amount of general county taxes lost inside. The constructive county rate outside is applied to the assessed value of railroad property outside, giving the amount of general county taxes lost outside. These two losses are added to the amount of taxes refunded by the county out of the county general fund on account of losses in districts on special taxes. The sum of the three is the total county loss.

The constructive state rate is applied to the total amount of non-operative property which escaped state taxation, and the result is the total gain to the county because of the separation.

The amount resulting from subtracting the total gain from the total loss is the net loss to the county.

THE FRANCHISE TAX.

Under the constitution, general corporations, which are those other than the public utilities, banks and insurance companies whose property is especially separated for state revenue, are assessed and taxed on their franchise value solely by the state for state purposes. The other property value of these general corporations is assessed and taxed locally.

The franchise value is, roughly speaking, the value existing in excess of the physical value because of the exercise of some privilege or right. It is an intangible value which has defied legislators definitely to define and courts closely to interpret. It can be approximated only by the comparison of detailed information laboriously and scientifically arranged and by the exercise of sound judgment. Without such information so arranged there can be no equitable assessment of the value.

The value of the franchise varies according to the nature of the business and the rights and privileges exercised.

Practically no attempt has been made during the six years since this tax has been applied to classify systematically the different corporations and determine equity as between them.

The state is getting approximately two millions of dollars annually from this tax. It is a tax in addition to the local property tax which these corporations pay and in addition to the state license tax. It is a tax which may be easily abused, wittingly or unwittingly.

Importance of tax required special study.

This commission believed it was of such importance that as thorough a study as possible should be made showing how the tax rested and how it could better be administered. The work has been somewhat costly, from the fact that duplicate copies had to be made of the returns made by the corporations.

This commission did not make an arbitrary selection of merely a few corporations in different classes, but made a study of the whole group of some eighteen thousand corporations. The reports made in 1915 were used. After getting the duplicate record they were grouped into over two hundred natural classifications and the data compiled for each class. Each class was then subdivided into seven groups on the basis of amount of gross receipts under $10,000, $10,000 to $20,000, $20,000 to $50,000, $50,000 to $150,000, $150,000 to $500,000, above $500,000, and lastly those reporting no gross receipts. The total gross receipts is used as a basis because that is the most stable value returned and probably the most equitable base upon which to compare the burden of the tax.

In each group, under each class is shown the total gross receipts, net receipts, assessed value, true value reported, franchise value, franchise tax and total taxes reported. In addition to this we have figured out what the license tax would have been if it had been applied in 1915, as it has been since then.

Results of study show gross inequality.

In conformity with the law requiring secrecy regarding these individual reports, this commission has not denoted the name of the business in each class in the table appended, but has denoted them numerically, retaining the key. The importance of the work is the value which it can be to the board administering the tax and to show to those wishing to delve into the figures the result of the burden of the tax as it has been applied. The first striking result of the study is the fact that almost without exception, measured by every standard available, the tax is extremely heavy on the smaller companies. This is a common fault in taxation, as the taxable value enlarges the perspective of the assessing authority contracts. There is striking difference between the different classes, which is both modified and intensified when the character of the business is known. Strict reliance, of course, can not be placed upon the figures given for the net receipts, but the comparison on that basis bears out the same results of gross inequality. Likewise, the figures for full value are not wholly reliable. Yet the chances are they average fairly well with other returns, and in these we see the same inequality in the measurement of the tax.

We give herewith a table of several classes of corporations comprising different characters of business, showing percentages of franchise tax to gross receipts, net receipts, assessed value and full value reported.

Table Showing Franchise Tax Per $100 of Gross Receipts, Etc., of Certain Classes of Corporations.

	Class 9	Class 19	Class 50	Class 72	Class 73	Class 74	Class 96	Class 97	Class 100	Class 101	Class 111
Showing gross receipts not exceeding $10,000	$0.214	$0.314	$0.256	$0.347	$0.347	$0.223	$0.255	$0.201	$0.342	$7.102	$0.370
Net profits reported	2.610	1.710	10.171	2.274	6.177	2.970	1.132	16.260	4.164	74.671	---------
Assessed value	.641	.565	.833	.280	.140	1.319	1.113	40.000	.599	.128	.609
Actual value reported	.299	.310	.392	.188	.059	1.129	.578	40.000	.270	.090	.342
Showing gross receipts from $10,000 to $20,000	$0.089	$0.087	$0.108	$0.135	---------	$0.100	$0.087	$0.093	$0.106	$0.144	$0.085
Net profits reported	1.970	---------	4.260	1.489	---------	2.036	6.593	4.131	---------	1.142	---------
Assessed value	.845	.246	1.165	.268	---------	1.261	.522	.633	1.050	1.163	.145
Actual value reported	.493	.370	.557	.430	---------	.198	.380	.241	---------	.305	.083
Showing gross receipts from $20,000 to $50,000	$0.058	$0.572	$0.058	$0.058	$0.095	$0.048	$0.058	$0.086	$0.072	$0.223	$0.092
Net profits reported	1.524	.908	2.103	1.204	.316	2.302	1.267	.949	1.800	1.606	.941
Assessed value	.361	.686	.450	.307	1.062	.572	.501	1.213	---------	.132	.592
Actual value reported	.539	.446	.226	.145	---------	.344	.254	.835	---------	.299	---------
Showing gross receipts from $50,000 to $150,000	$0.055	$0.036	$0.048	$0.043	$0.147	$0.032	$0.058	$0.048	$0.055	$0.114	$0.328
Net profits reported	1.616	1.525	.699	.864	1.518	1.280	.963	2.021	---------	2.188	5.976
Assessed value	.598	.225	.491	.346	.476	.329	.303	.565	.543	1.270	.818
Actual value reported	.268	.154	.304	.164	.258	.321	.201	.550	.220	.174	.515
Showing gross receipts from $150,000 to $500,000	$0.032	$0.033	$0.050	$0.041	$0.038	$0.022	$0.052	$0.054	$0.030	$0.100	$0.090
Net profits reported	9.471	1.232	1.341	1.047	1.580	1.388	1.029	2.052	2.038	1.925	1.378
Assessed value	---------	.551	.287	.241	.548	.827	.323	.527	.257	.270	.456
Actual value reported	.062	.298	.203	.141	.328	.128	.248	.725	---------	.151	.245
Showing gross receipts exceeding $500,000	---------	$0.034	$0.040	$0.014	$0.023	$0.025	$0.150	$0.058	---------	$0.100	$0.080
Net profits reported	$19.630	.702	.470	.985	1.050	1.042	1.733	.895	---------	4.504	.764
Assessed value	---------	.242	.353	.356	.504	.424	.963	1.037	---------	.168	.642
Actual value reported	.850	.109	.204	.185	.311	.188	.558	.829	---------	.123	.363

Table Showing Franchise Tax Per $100 of Gross Receipts, Etc., of Certain Classes of Corporations—Continued.

	Class 140	Class 181	Class 194	Class 200	Class 203	Class 209	Class 217	Class 227	Class 235	Class 236	Class 237
Showing gross receipts not exceeding $10,000	$0.267	$0.393	$2.409	$0.563	$0.608	$0.235	$0.623	$0.189	$0.825	$2.763	$0.828
Net profits reported	2.051			3.286	3.707	1.477	2.955	2.526	4.307	5.769	4.547
Assessed value	40.320	.827		.168	.174	.431	.070	.848	.115	.407	.276
Actual value reported	.589	.347	.600	.105	.068	.436	.068	268	.699	.172	.209
Showing gross receipts from $10,000 to $20,000	$0.167	$0.111	$0.091	$0.291	$0.210	$0.102	$0.303	$0.122	$0.119	$0.299	$0.372
Net profits reported		1.250	.633	2.363	1.912	8.368	1.229	1.459	.562	2.146	3.388
Assessed value	.545	1.847	2.000	.140	.113	1.234	.111	.930	.099	.182	.311
Actual value reported	.107	.523		.073	.045	1.721	.081	.733		.112	.210
Showing gross receipts from $20,000 to $50,000	$0.054	$0.057	$0.229	$0.323	$0.245	$0.067	$0.261	$0.100	$0.182	$0.547	$0.309
Net profits reported	.225			1.646	3.386	1.341	1.717	.835	1.042	3.329	1.281
Assessed value	2.000		.272	.113	.172	.310	.088	.621	.178	.301	.375
Actual value reported	.420		.022	.125	.114	.241	.077	.313	8.520	.260	.268
Showing gross receipts from $50,000 to $150,000	$0.014	$0.029	$0.034	$0.171	$0.098	$0.062	$0.267	$0.128	$0.065	$0.269	$0.307
Net profits reported	.620	1.744		1.374	1.293	.397	1.283	.726	.280	2.026	1.203
Assessed value	2.979	.558		.109	.171	.054	.148	.513	.063	.156	.408
Actual value reported	40.260	.245	.160	.077	.058	.060	.062	.311	.073	.190	.184
Showing gross receipts from $150,000 to $500,000	$0.028			$0.082	$0.154	$0.031	$0.092			$0.513	$0.319
Net profits reported				.073	278.873	.995	.312			2.783	1.162
Assessed value				.094	.191	.319	.119			.339	.541
Actual value reported				.057	.090	.118	.270			.270	.375
Showing gross receipts exceeding $500,000	$0.008				$0.022		$0.275			$1.095	$0.336
Net profits reported	.772						8.647			8,724	1.575
Assessed value	1.544				.201		.115			.230	.564
Actual value reported	.691				.180		.091				.426

STATE LICENSE TAX.

At the session of the legislature in 1915 the state license tax on corporations was reenacted, after having been repealed in 1913 on the supposition that the tax was unconstitutional. Subsequent to the repeal in 1913, however, the supreme court reversed its first ruling and declared the tax to be one that could legally be levied.

The tax is levied annually upon the basis of the amount of capital stock, ranging from $10 on capital stock not exceeding $10,000, up to $1,000 on capital stock exceeding $10,000,000. In the table appended to this report, showing a segregation of data on the franchise tax, we have included an item showing the amount of license tax which is levied against the different groups and classes of corporations. This tabulation shows that the license tax is more burdensome on the smaller companies when compared on the basis of gross or net receipts and reported full value of the property, but it is not necessarily unjust because of this showing.

The tax is applied as above stated solely on the basis of capitalization, and if concerns over-capitalize for any reason, the method of the levy of the tax, or the existence of the tax itself, is not at fault. The tax, while being levied to authorize the transaction of business, should to some extent accomplish a restriction upon the misuse of their capitalization. If, therefore, the tax is burdensome because of over-capitalization the fault lies not with the taxing power but with the over-capitalizing corporations seeking protection and privilege under the law.

Public utilities escape license tax.

Considerable inequality does exist from the application of this tax, because of the fact that the tax is not applied to the public service and other corporations taxed exclusively for state purposes. The tax can not be applied to the latter corporations, and, therefore, the tax is an additional burden on general corporations because they pay a tax on their franchise value and also a tax on their property value, which is relatively the same burden of tax as that applied to the public utilities by the percentage levied upon their gross receipts. This fault can be remedied by fixing the percentages applied to the public utility corporations high enough to cover the additional burden reflected by the license tax.

There is also some inequality existing because of the license and the franchise tax as between general corporations and unincorporated businesses. Your commission suggests as a remedy the application of an income tax to individuals and unincorporated businesses only. We believe the license tax is a proper tax when equitably applied and equalized.

Penalty for failure to pay license tax.

It has been pointed out frequently that the California procedure of forfeiture of charters of corporations because of nonpayment of the state tax is unusual and extremely severe, that it affects not only the prospect of the state finally to collect the tax and to continue collecting a tax from that source, but that it seriously interferes with the rights of individuals dealing with the corporations affected. It also has been pointed out that the method of revivor under our statutory provision is questionable. Prior to the amendment in 1908 of section seven of article twelve of the constitution, the legislature was powerless to provide for the remission of forfeiture of the charter of any corporation, but since the adoption of that amendment there is no power vested in the legislature to provide for the remission of the forfeiture of the charter of a quasi-public corporation.

Undoubtedly under this provision any corporation which had forfeited its charter before the amendment of the constitution in 1908, and any quasi-public corporation which has forfeited its charter since that time, can not legally be reinstated. The legislature, however, has apparently ignored this constitutional restriction and attempted, by an act passed at the special session of 1906, and also an act at the regular session of 1907, to provide for so-called revivors or restorations. A large number of corporations paid the sums which they were informed were necessary under the law to restore them to their corporate position and have continued to pay annually the taxes imposed.

Injury resulting should be remedied.

It would seem that these attempted revivors are wholly unauthorized and invalid. If so, the injury is not only to the corporation itself but in many cases to sundry persons who have dealt with these corporations in the faith that they were legal organizations.

Even if the fault had been with the corporation itself in the first place, it is more frequently an oversight because of confusion arising out of a multiple system of payment of annual taxes, rather than a desire to evade the payment levied against them.

It is practically impossible for the ordinary person to have knowledge of all of the conditions surrounding the existence of these corporations or to delve into the matter of their proper conduct under the complications of the law. The fact that each year several thousands of these corporations go delinquent and that upon notifications a large number of them promptly remit their tax, together with the penalty, shows that there is something wrong in the administration of the tax and that the penalty itself does not prevent delinquency.

We recommend that provision be made whereby all corporations becoming delinquent shall be notified of the delinquency and that additional penalties be applied for continued delinquencies rather than an immediate forfeit of the charter. We would suggest that after a certain period of continued delinquency the state itself, through the Corporation Commissioner, should step in and have authority to control the business of the corporation to the end of meeting its proper obligations.

PROBLEM OF JITNEY BUS.

Within the past few years there has suddenly arisen a question of serious concern regarding the so-called jitney bus, motor bus and motor truck. At the last session of the legislature the question caused much agitation and consideration on the part of both the public transportation utilities and the jitney bus organizations. At that time the problem was comparatively new. Very little reliable data could be presented for consideration. The legislature passed an act proposing to regulate and tax this new form of transportation, but the act did not become a law, principally because of the fact that experience had not demonstrated whether or not it was purely a local or state matter for regulation and taxation.

This commission is disposed to look at the problem as being primarily a matter of regulation; that the security and service to the public is more vital than the matter of the taxation of the industry. Looking at the matter of taxation as being secondary, these points, so far as the state is concerned, seem to stand out:

First—That the entrance of this means of transportation has to some extent reduced the gross receipts of the street railways and railroads, causing a probable loss to state revenues of something like two hundred thousand dollars a year.

Second—That the taxation by local authorities of this particular industry has been sporadic, unequal and in some cases severe.

Third—That this form of transportation has been declared by our supreme court to be a public utility coming under the jurisdiction of the State Railroad Commission. But it is not a utility that can be taxed by the state in the manner that other transportation utilities are taxed, because it does not fall in any of the classes of corporations separated under Constitutional Amendment No. 1.

Purely from the standpoint of taxation, therefore, the jitney bus is a subject for local revenue. The state can come in and tax only for state purposes, on a basis of regulation. Localities are continually being deprived of property for local taxation by the extension and development of public utilities; therefore, to maintain that because the state is losing two hundred thousand dollars a year because of this new form of transportation it should levy a tax upon the jitney bus in order to recoup its resources is not logical or just.

The fact that the state has an unfortunate system of taxation, which may be crippled because of changinig conditions, such as municipal and government ownership or unusual developments, does not give the state the right arbitrarily to recover its losses. Its recourse should be to change its system of taxation to meet the changing conditions.

The suggestion that a state tax be levied against the jitney bus at a rate equal to the state rate levied against railroads and street railways to compensate the state for loss of revenue occasioned by the intrusion of this new form of transportation, does not seem warranted, because the jitney bus unlike the railroads and street railways would not be exempted from local taxation. The cities and counties would continue to levy a tax upon the jitney, which would result in an unjust double taxation.

With the state arbitrarily taxing the new form of transportation, and with each locality using its power to regulate and tax, the new industry would stand small chance of demonstrating whether or not it can develop into a better form of transportation than we now have, or into an auxiliary form of transportation which will augment the old forms of transportation in the development of our state.

We present herewith a statement from representatives of both the railway and railroads and the jitney bus industry. These statements present in a concise way the feelings of both sides of the controversy. It is hard to say just where the line of justice lies as between the two contentions. This commission believes, however, that proper methods of regulation must be inaugurated and enforced before it can definitely be ascertained whether all or a part of the industry should be made a subject for state taxation.

If the state attempts to go into the matter of taxing every form of endeavor that in some way affects public service enterprises, it will encounter a multitude of complications. The greater portion of the new service is carried on within the municipality or within the county. So long as the state adheres to the principle of separation, it should not put itself in a position of attempting to obtain revenue from a source which is legally and naturally taxable for local purposes. It is quite probable, however, that more uniform and better regulation can be had, and more equitable taxation of the peculiar industry could be established, if the state regulated and taxed it and properly distributed the result of the tax.

STATEMENT ON BEHALF OF STREET RAILWAYS.

State Tax Commission,
Sacramento, Cal.

GENTLEMEN:

From the figures we have obtained it is estimated that there are 1,750 so-called "jitneys" competing with the electric railways in this state, charging a fare of five cents, and 800 interurban stages competing with the interurban electric and steam lines in the state. We have no accurate data as to the number of freight trucks operating as common carriers; the number, however, is in excess of 100, not including the trucks privately owned and operated by wholesale and retail merchants.

A close estimate for the year 1915 places the losses of the electric lines as a result of the jitney and auto bus competition, in round numbers, at $3,150,000, and the losses of the steam lines at $1,140,000, a total of $4,290,000; and from the information we have gathered covering the first six months of 1916 the indications are that the losses this year directly attributable to this competition will exceed $5,000,000.

When it is considered that the gross receipts of the automobile competitors of the electric railways are now in excess of 10 per cent of the gross receipts accruing to the latter, it is evident that they have become an important factor as a source of state revenue under our present system of taxation.

As the revenue and tax laws of this state require the payment to the state for state purposes of 5¼ per cent of the gross receipts of the electric and steam lines, it would seem proper that the automobile performing a similar public service should pay in the form of a license fee or otherwise to the state such an amount as would be the equivalent of 5¼ per cent of its gross receipts; and, also, as the state, counties and cities, through their system of good roads and paved streets, are furnishing a free right of way and roadbed to this class of utility, some special compensation should be paid for these valuable privileges.

The electric railways pay to cities percentages of their gross receipts varying from 1 to 3 per cent for the privilege of using streets. In addition to this tax they are required to pave the space between rails and on two feet each side thereof, and maintain the same, and the cost of this work will amount, in the aggregate, to 10 per cent of their gross earnings.

The electric lines of the state are therefore paying in taxation for the right to do business between 15 and 17 per cent of their gross receipts

The gross earnings of the average jitney may be conservatively estimated at $6.50 per day, or, in round figures, $2,000 per year. At the present rate paid by the electric lines for state purposes their taxes on this basis would be $105 per year, or, on the basis of seating capacity for a Ford machine, would amount to about $25 per seat per car, excluding the driver's seat. Under the present motor vehicle act a Ford car pays $8.80 per year, and is taxed as personal property by the cities and counties at approximately $6 per year, making a total annual tax of $14.80. In some cities, however, they are paying an additional license tax. In San Francisco this tax is $10 per annum, in Los Angeles $30 per annum and in Oakland $60 per annum. In a number of cities they are not required to pay any license tax.

The large stages being operated by companies with seating capacity varying from twenty to forty seats—having in mind the company operating these stages between San Francisco and San Mateo, two companies operating twelve stages between Los Angeles, Pomona, Ontario and Uplands, a company in Bakersfield operating about fifty stages in interurban service—are doing a very large business. The gross earnings of these companies will exceed the gross earnings of some of the smaller electric lines in the state.

The so-called ''jitney'' and auto stage have been declared common carriers in numerous recent court decisions, and placed under the jurisdiction of public service commissions in nine states and the District of Columbia. The state of New Jersey requires the payment of 5 per cent of their gross earnings to cities; in the city of New York they are recognized as public utilities, the owners required to obtain a franchise before operating and a similar payment is exacted.

Without attempting to touch on the question of the character of service they are performing, or the absence of the regulation the electric railways are subjected to, the fact remains that they are here as a public utility competing with other public utilities being taxed on the basis of their gross receipts by the state and they should, in any equitable system of taxation, bear their proportionate share of the tax burden. Apropos of the question of taxation and regulation I quote from a recent decision of the Georgia railroad commission, as follows:

> The character of the business conducted by the operators of ''jitney busses,'' sustains our opinion upon the jurisdictional question raised in this case. It is identical with that conducted in this and other cities of the state by street railroads. They seek the same patronage, over the same routes, for the same charges, under similar conditions, except that the street railroad company occupies and uses a fixed space in the street *for which it pays,* while the jitney uses any part of the street necessary to its business, *for which it does not pay.*
>
> The business of these common carriers is not confined to urban transportation. They are conducting public transportation businesses at this time in several sections of the state, in active and successful competition with steam railroads, using the public highways for these purposes. The commission has in its files timetables printed and distributed by the ''Royal Blue

> Line." A. W. Elliott, manager, Weston, Ga., in which it clearly holds itself out as a common carrier. If there be any sane reason for governmental regulation of the business of railroad common carriers of passengers between Lumpkin and Macon, or Americus and Albany, it must apply with equal force to the same business as conducted by the "Royal Blue Line."

I have attempted to deal with the subject in a general way, but if there is any specific information you would like I shall be very glad to furnish it if it is obtainable. I trust this matter will be considered by you and your associates as of sufficient importance to receive your consideration along with other tax problems before you.

Attached hereto please find copy of carefully prepared statement showing the losses of the electric and steam lines of the state due to the competition of the jitney and auto stage during the year 1915.

Yours truly,

W. V. HILL,
Manager California Electric Railway Association.

Revised Memorandum Showing Estimated Loss in Gross Receipts to the Electric and Steam Lines of the State During the Year 1915 by Reason of Jitney and Auto Stage Competition:

Association lines:	Jitneys.	Private cars.
Bakersfield and Kern Electric Railway	$50,000 00	
Central California Traction Company	52,214 37	
Fresno Traction Company		$60,000 00
Glendale and Montrose Railway	6,570 00	
Humboldt Transit Company (includes private cars)	18,999 29	
Los Angeles Railway Corporation	500,000 00	
Northern Electric Railway	30,000 00	
Northwestern Pacific Railroad Company (steam and electric divisions)	40,000 00	
Oakland, Antioch and Eastern Railway (none)		
Pacific Coast Railway Company	24,000 00	
Pacific Electric Railway Company	454,360 00	
Pacific Gas and Electric Company (Sacramento Street Railway)	100,000 00	
Petaluma and Santa Rosa Railway Company		8,000 00
Peninsular Railway Company, passenger	11,850 00	
Peninsular Railway Company, freight	500 00	
Riverside, Rialto and Pacific Railroad Co. (none)		
San Diego and Southeastern Railway Company	150,000 00	
San Diego Electric Railway Company (includes $10,000.00 for Point Loma Railroad Company)	210,000 00	
San Francisco, Napa and Calistoga Railway (none)		
San Francisco–Oakland Terminal Railways	400,000 00	
San Jose Railroads	4,700 00	
Santa Barbara and Suburban Railway Company	8,000 00	
Southern Pacific Company (electric division) (none)		
Stockton Electric Railroad Company	10,000 00	
Tidewater Southern Railway Company	40,000 00	
Union Traction Company (none)		
United Railroads of San Francisco	1,000,000 00	
Visalia Electric Railway Company	35,000 00	
Totals	$3,146,193 66	$68,000 00

Electric and cable lines not affiliated with the association:	Jitneys.	Private cars.
Monterey and Pacific Grove Railway (six months; jitneys discontinued latter part of June, 1915, account ordinance passed in Monterey)	$1,640 00	
Modesto and Empire Traction Company (none)		
Municipal Railway of San Francisco (cannot estimate).		
Nevada County Traction Company (includes private cars)	1,242 70	
South San Francisco Railroad and Power Company	1,800 00	
California Street Cable Railway (no loss account grades).		
Total	$4,682 70	

Steam lines:	Jitneys.	Private cars.
Amador Central Railroad Company	$3,000 00	
Atchison, Topeka and Santa Fe Railway Company (passenger loss only)	335,000 00	1,200,000 00
Colusa and Lake Railroad Company (auto competition for several years was largely responsible for discontinuance of operations).		
Holton Interurban Railway Company, passenger	25,000 00	
Holton Interurban Railway Company, freight	15,000 00	
Lake Tahoe Railway and Transportation Company	1,600 00	
Los Angeles and San Diego Beach Railway Company	7,900 00	7,800 00
Mount Tamalpais and Muir Woods Railway (no loss account grades).		
Nevada County Railroad Co. (N. G.) passenger	350 00	
Nevada County Railroad Company, (N. G.) freight	5,000 00	
Ocean Shore Railroad Company, passenger (19.26 per cent)	13,095 00	
Ocean Shore Railroad Company, freight	6,000 00	
Pajaro Valley Consolidated Railroad Company	360 00	
Quincy Western Railway Company (no competition account friendly attitude of people).		
Sierra Railway Company of California	50,000 00	
Santa Maria Valley Railroad Company (none)		
Southern Pacific Company (passenger loss only)	500,000 00	
Stockton Terminal and Eastern Railroad Company	4,200 00	
Sunset Railway Company (passenger loss only)	43,200 00	
Southern Pacific, Los Angeles and Salt Lake Railroad Company (passenger, including private cars)	75,000 00	
Southern Pacific, Los Angeles and Salt Lake Railroad Company (freight, Los Angeles and San Pedro business)	7,500 00	
Tonopah and Tidewater Railroad Company (none)		
Ventura County Railway Company	1,607 49	
Western Pacific Railway (no records kept).		
Yreka Valley Railroad Company	5,000 00	
Yosemite Valley Railroad Company	40,000 00	
Totals	$1,138,812 19	$1,207,800 00
Grand totals	$4,289,688 85	$1,275,800 00

STATEMENT ON BEHALF OF JITNEY ASSOCIATIONS.

State Tax Commission,
Sacramento, California.

GENTLEMEN:

Referring to the situation before your department, involving the relationship of the various electric railways and the jitneys in this state, permit me to say, on behalf of the membership of our organization, that in determining the question of the taxation of the jitneys, the prime consideration is that the taxing power of the state should not be used to destroy the industry from which revenue is sought.

The automobile is really nothing but a continuation of the old, horse-drawn wagon, the gap between them being the improvement attained through rail transportation, which was an enormous advance over the horse-drawn vehicle. From the horse-drawn wagon to the automobile is a greater step in progress, than from the wagon to the vehicle confined to rails. But this latest method of transportation suffers under the difficulty of all beginnings, in that the automobile is not fully equipped or established on the permanent lines which its future development will take.

It is important to note this consideration, in view of the fact that railway managers, both of steam and electric lines, contend that the regulation of the jitney—in the way of taxation and also of determining routes, schedules, etc.—means that the jitneys should have prescribed for them the form of regulation to which railways are subjected. There is no more reason for subjecting the automobile form of transportation to such restrictions, than for applying them to the old, horse-drawn vehicle. It would be just as reasonable to impose upon the farmer, hauling his product to market, or transporting himself and his neighbors about the country, such schedules, taxation, etc., as it is to place the automobile under such regulations; for, the reason for establishing schedules and making regulations for the steel railways, is primarily to guarantee the public some minimum service for the special privileges granted to the railway companies.

Railways, in order to run profitably, must have exclusive rights, on account of the enormous outlay required to prepare a roadbed, without which the railway can not operate. This initial expense is so large that none but those with the most extensive resources are in a position to meet it. To induce large capital—particularly in undeveloped territory—to enter into such enterprises, it must be granted, for some limited time at least, advantages and privileges commensurate with the financial outlay required. The conclusion is inevitable that, if selected groups of railway men are to be given these privileges as against others, certain payments and guarantees must be made to the community. Now, these reasons are absent in the consideration of prescribing schedules and regulations for automobiles that run on the public highway to which the whole community (including competitors of the jitneys from their own ranks) is admitted. There is no exclusive privilege granted, of any kind, in the case of the jitneys, and so schedules and service will, in the very nature of the case, take care of themselves. What regulations are required—and are, indeed, indispensable—are in the line of the exercise of the police power, to safeguard life and limb. Outside of that, it is to the best interest of the state and the community to eliminate all further regulations, especially if the result of such regulation would be the checking of the development of the new and better form of transportation.

In addition to the question of regulations, the opponents of the jitney—and in particular those opponents who have their capital invested in railway enterprises—urge that jitneys should be taxed, not only in proportion to the value of the investment, not only in proportion to the advantages received from the state and the burdens that may properly be placed on a comparatively small business, but in such a proportion as would, by the very nature of the case, have for its object the destruction of the enterprise—that is, it would kill the goose that lays the golden egg.

As we understand the matter, the railway interests of this state, particularly the street railways, are subject to three forms of taxation. First, street and electric railways have to pay a certain percentage, according to the size of the bid offered, to acquire a franchise property; second, they are compelled—more or less, according to the community in which they happen to be, and the conditions of the franchise under which they operate—to pave such portions of the streets as they run over; third, they are taxed a percentage on the gross receipts of the company. In consideration of this third form of taxation, they are exempt from all local, or so-called property, taxes in the communities in which they operate.

In contrast to this, we might state that those of us who are engaged in the jitney business in San Francisco (I mention this city because I am more familiar with the conditions prevailing here) are subject, first, to a state tax for a chauffeur's badge; second, we pay a property tax, according to the value of the investment; in the third place, we have to pay a license to the county, for operating a transportation business; fourth, we pay another tax to the state, called the state license tax.

Now, these four varieties of taxation amount to about $25 a year on a Ford car, varying in proportion to the amount of money invested. This tax on the Ford machine amounts to $6.25 per seat per annum, being higher for larger machines. In other communities the license is still greater. In Sacramento, for example, we pay a yearly license of $40. In Oakland, the yearly license is $60, etc., the amount varying in each community; so that, in taking San Francisco, we are citing a community where the jitney is treated more fairly, perhaps, than anywhere else.

The United Railroads company in San Francisco (taking again my own city, where I am better acquainted with conditions than in other places) is paying about $500,000 a year, from its gross receipts, to the state. As its investment is approximately $50,000,000, the tax is thus only 1 per cent on the value of the property. This 1 per cent paid by the United Railroads on its investment, per annum, is *less than one-fifth* of the percentage that the jitneys are compelled to pay, even in this community, on the investment. If we take the jitney men in a community like Oakland, where the license is $60, and where all other expenses are equal and are in addition to the tax paid, their total expenses are $75, which, in proportion to their investment, is equal to 30 per cent, or *thirty times* as large as the United Railroads company is paying, in proportion to property held by each of them.

Now then, it has been stated a great many times, that the poor man should be taxed equally with the rich man. Some urge that the rich man ought to be taxed more than the poor one; but no one, I believe, will be willing to take the responsibility of urging that the poor man should be taxed thirty times as much as the rich man. Yet that is exactly what is being done in Oakland. I do not think that anyone would have the hardihood to urge that the poor man should be taxed even five times as much as the rich man; yet, in the case of the jitney man in San Francisco, the community is taxing him five times as much as it does the rich and powerful United Railroads.

We do not want to say here anything against the United Railroads—we do not think that is necessary. Everybody knows the history of this corporation; everybody realizes what it is capable of; everybody recognizes with what power and influence it has fought the jitneys of San Francisco. In the larger sense, there is little differentiation to be made between good and bad corporations, when in the enjoyment of special privileges, the bad corporations are simply less particular in their methods of obtaining franchises. But we do not think that it would be the fair thing or the just thing that the state should take the part of the United Railroads against the jitney and subject the latter to still further burdens.

It is urged, however, that the United Railroads and other similarly placed corporations have to pay, in addition to their taxes to the state, also for the repair of the streets. It might as well be urged that, in addition to paying for the street repairs, they have to pay for electrical current and repairing of cars, and meet the pay roll. These are all items in operating expense. The repairing of the streets that the railroads themselves tear up is just as much a part of their operating expenses as is the payment for current and labor; and, if this is to be considered a part of their taxes, then the jitney men might step forward and state that they themselves are subject to the heavy premium they pay on the bonds, which, in the city of San Francisco, this year amounted to over $100 on a Ford machine. That, on a car carrying four passengers, amounts to $25 per seat. We are not objecting to this expenditure for the bond; but, if we are going to count up our expenses and use them as a reason for having competing concerns taxed, the premium that we have to pay for our bonds would, I think, be a legitimate item to cite in order to show that we are taxed enough. If anyone should urge that the street railways, while repairing the streets, permit the use of those streets to the general public, it could be retorted, and properly so, that streets on which there are no railways cause much less expense for repairs than do streets on which the railways operate, because these railways break up the streets into sections, chipping off is the regular thing, and the breaking up of the road is very rapid. The street repairs paid for by the railways are not in proportion to the destruction that they cause; whereas the wear and tear caused to the road by the jitneys going over it, is negligible in quantity and not at all in proportion to the amount that they have to contribute towards the community's expense.

The other item urged by the railway companies, *i. e.*, that they sometimes have to bid for the privilege of an exclusive right to operate, is one that has less merit, if possible, than any of the other contentions; for, there is no driver of a jitney, or any group of men who drive jitneys, that would not be willing to put in a bid to run automobiles in any community and receive in return the exclusive privilege of doing so. This percentage paid for an exclusive street railway grant is in the nature of a rental, in the same way as a man who gets a choice spot on a crowded corner, naturally pays a higher rent than if he occupied a space further removed from the center of traffic.

The jitney men are not urging that they be granted an exclusive privilege. It would be against public policy to permit that; it would not be to the best interests of the community to grant to anyone an exclusive monopoly in driving automobiles, and the reasons for this are obvious. Any number of people may use the same road, up to the limit of traffic convenience; and within those limits competition between the jitney men—or, as we say, competition from within—will take care that prices remain at a level where the average net returns will be no greater than in other enterprises involving the same ratio of labor and investment. The railroad, on the other hand, in order to operate efficiently and with the greatest convenience to the public, requires uniform control and central management as an indispensable condition. Under those circumstances, until the principle of public ownership is more generally accepted, an exclusive monopoly or a franchise—whether revocable or for a period of time—is more or less defensible. Competition in the case of the railroad has its limitations; and, in order to prevent a privilege of that kind from being given, without receiving proper returns or adequate service, it is submitted to a competitive bid, and should be so submitted; for, by that means, there is an equalization between the privilege granted and the superior returns coming as the result of that privilege. *There is no such necessity in the case of the jitney.* With it, as has been stated before, there is no way in which exorbitant charges or profits may accumulate in the face of the competition that is sure to follow a more than average income. Hence, we jitney men of this community, at least, are of the opinion that we are taxed sufficiently, within those limits beyond which sound political economy warns all communities away. The principles laid down by Adam Smith hold in the case of the jitney, as well as in other lines of business.

On those lines—and they are the only sound principles of taxation that we know of—we crave the consideration of the legislators of California, and urge them not to permit themselves to be stampeded into an attempt to destroy a rising industry which, even if nothing is done for it except to leave it alone, will develop to a point where it will become the most important form of transportation of the future. The jitney is particularly important for undeveloped territory. In such territory, on account of the enormous outlay required for the building of the roadbed, there is no security and no surety whatever that it will be profitable to establish a street railway system. Jitneys (or stage lines) may be used for this purpose without any great risk, and may grow in proportion to the increase in traffic requirements. In this way, new territory may very often be developed much earlier, with greater advantage to the community, than if it were necessary to depend on railway lines for expansion.

The automobile is generally admitted to be a superior form of transportation. To the thousands of people who now ride in automobiles, and who, but for the jitney, could have known the pleasure of this mode of travel only through seeing others enjoy it, the jitney has brought an amount of comfort, health and happiness that is incalculable; and no one, so far as we know, has any serious criticism to make against it, except the enterprises that are in direct competition. There is no public demand for any increase in taxes to be imposed on the jitney; there is no sound economic reason for such a procedure. The real purpose of this demand for an increase in jitney taxation is not that of revenue to the state, but of annihilation of the industry as an effective competitor, thus ultimately crippling the service afforded the community.

We may illustrate the effect of over-regulation and over-taxation by instancing what took place in Oakland. I mention that city because regulation there is drastic, having been frankly forced by the street railway monopoly; and the results are patent. Before the present form of licensing and regulation went into effect, there were in Oakland 300 jitneys, more or less; but, when the license was raised to $60 and impossible regulations were put in force, the number was cut down to 100. The net result of such procedure was that the community was deprived of the use of 200 automobiles in transportation service, and is now compelled to use forms of transportation that it would not have resorted to except for the unfair regulation and taxation that has been forced upon the public.

There is only one seemingly valid argument that is urged in this matter of increased jitney taxation, and that is the claim that the revenues of the state are being seriously affected through the inroads made by the jitneys on the incomes of the railroads. I say advisedly, ''seemingly valid'' argument, for every claim of this character has been based, not on statistics gathered, submitted and analyzed by a competent economist, but by estimates on the amount taken in by the jitneys, furnished by those who are unfriendly to jitney competition. We submit that this is not a valid method of determining such a question. If the jitneys have dug into the revenues of their competitors, the proper thing to do is to submit the full facts in the case, and see what proportion, if any, of the revenues of the jitneys come from diminished railroad revenues.

To illustrate: In the city of San Francisco, the jitney has come along and taken a part of the peak loads, in the rush hours. To this extent it has done one of two things (or possibly both). It has diminished the amount of investment that the railroads have to make in order to take proper care of the peak loads, which investment would be altogether out of proportion to the revenue received from the one-way haul during the rush hours; or it has enabled passengers to ride in some sort of comfort to and from their work. In either event, this is not a deduction from the legitimate revenues of the railroads.

Another portion of the jitney revenues comes from the ordinary use of automobiles for pleasure purposes, and the kind of service that results in a saving of time. This sort of revenue is not taken by the jitneys from the railroads, but from a line of work called the taxicab (rent) service; and, as the taxicabs have not been subjected to anything like the taxation placed upon the jitneys, this really brings in to the state a revenue that it did not have before.

A third important source of revenue comes to the jitney, which belongs neither to the railroads nor to the rent-service automobile, but which is a thing that the jitneys themselves have created. The jitney encourages many people to use the automobile in two different directions. First, instead of having a rig of their own (either an automobile or horse-drawn vehicle) a large portion of the public makes use of the jitneys. This interferes with no one's revenues, but does add to the revenues of the state; second, the jitney enables a large proportion of working people and people of moderate means to indulge in the luxury of a ride in an automobile, who, before that time, simply walked.

Yours truly,

Alexander Horr,
State Federation of Jitneymen.

AUTOMOBILE TAX.

In the taxation of automobiles the local assessors, to a considerable extent, have encountered serious obstacles in levying an equitable and proper assessment. This is reflected from a tabulated statement which is appended to this report. This table shows that on the first Monday of March, 1916, there were registered with the State Motor Vehicle Department 149,249 machines. It also shows that there are reported assessed from the different counties a total of only 127,051 machines. From this it will be seen that 22,198 machines, owned on the 1st of March, 1916, escaped taxation.

In Los Angeles County alone more than 9,000 automobiles, representing approximately $2,400,000 in assessed value, escaped taxation last year. In San Francisco the number of automobiles escaping taxation was 4,200, representing an assessed valuation of $1,270,000.

One method of correcting this condition would be to provide that a total tax on automobiles be levied and distributed back to the communities through the State Motor Vehicle Department, providing some plan can be worked out satisfactory to the local communities.

Such a method would at once make for considerable economy in the administration of the local assessor's office and would add no more to the burden of cost of collection in the state department. At the same time it would make practically a complete and equitable assessment of this character of property.

ONE ASSESSMENT FOR ALL PURPOSES.

One of the absurdities of our present method of assessment is that there are two different values for taxation in cities, one for municipal and one for county purposes, under a law providing for a full, cash value assessment for both.

The limitation of the rate in most cities accounts for the higher valuation by city assessors, and it also shows the uselessness of attempting to limit the amount of taxes by a maximum rate.

Where counties take over the assessment of cities there is a tendency to increase the city assessments over the county assessments. Where cities do their own assessing with a much higher value, the tendency is for the county assessed value to creep up more rapidly than on outside property, where no comparison of such value is possible. Under both methods, therefore, the city property generally bears a higher proportion of the county tax than the outside property. There is also a noticeable variation between cities in the same county. The correction for this is one assessment for all purposes at full value.

Logically, from a standpoint of economy, efficiency and equity, there should be but one assessment for all tax levy purposes. Instead of two offices and two sets of officials covering the same territory and identical properties, resulting in duplication of work, there should be one office and one set of officials properly and efficiently equipped to do the work. Naturally, the county assessor's office is the office to perform this function.

Along with the uniformity of assessments in each of the several counties should come the coordination of assessments throughout the entire state, with sufficient central machinery to accomplish the same through cooperation on the part of the county officers.

In a few of the localities there is a different fiscal year period from that generally observed. If uniformity of assessment and collection of taxes is to be accomplished there must be established a uniform fiscal year period for all state and all political subdivisions. This commission recommends legislation to accomplish this.

ANNUAL ASSESSMENT UNNECESSARY.

One of the outstanding defects in our method of administering the collection of taxes is the lack of notification of the existence of taxes against property. While there is little excuse, perhaps, for delinquency occurring in the matter of payment of city and county taxes, there frequently are special district, sewer and street assessments which become delinquent because it is next to impossible for nonresident owners, and even resident owners, to have information that such liens exist against their property.

As the law takes the property for the nonpayment of assessments, there should be definite notification of the existence of the liens. The cost of personal notification might be too heavy in each particular instance of assessment, but there is no reason why the existence of the tax should not be made known to the owner; for instance, by having notification of it carried on the county or city tax statement. We propose a law to accomplish this, and believe that it will meet the hearty endorsement of the taxpayers of the state. Similar laws in other states have eliminated the abuses that exist under our present laws.

It is entirely practical that the levying and collecting of all taxes and assessments could be so arranged that at one definite time the property owner would have knowledge of the total amount of taxes and assessments standing against his property and could pay the same, or the proper installment of the same, with a definite knowledge that his full obligations have been met.

It would be no matter of hindrance to public work, and not impossible to have all special assessments due and payable in whole or in part at the two periods of time when taxes are payable, and it would be infinitely better for the taxpayer to know that at certain definite periods he would be called upon to pay his entire obligations.

RECORD OF REAL ESTATE SALES.

In its preliminary report this commission suggested that whenever a transfer of realty is made and recorded, the actual consideration should be made a matter of record, along with the transfer of ownership. Some states have legal provisions of this sort, and California should have a similar requirement.

The actual value of property is the basis upon which the assessed value of property is now fixed under our law. At present the means of obtaining definite information as to the actual consideration, in approximating the cash value of property, is extremely difficult and uncertain.

This commission has made an attempt to collect sales data in different counties in the state, and while it realizes that during the past year or two a minimum amount of sales has been made, yet it is almost impossible to get a line on such data as should be available to assessing officials for use in checking values. The same difficulty has been encountered in the past when conditions were normal.

The consideration given in the sales of real estate is a matter in which the public, in a broader sense, is deeply concerned, and all data of this nature should be available for public use.

We recommend the passage of a law to accomplish this. Also, that a provision be inserted in the law requiring a record of the name and address of the owner of real property transferred. This latter provision would be a distinct protection to the property owner in that it would establish a record for official notification for taxes and assessments.

SCHOOL TAXES AND EXPENDITURES.

This commission has been requested by various organizations and individuals interested in school affairs to recommend ways and means of providing more money for the needs of our public schools. Inasmuch as the school expenditures of the state form a large percentage of the total expenditures, both state and local, the problem deserves consideration from the economic standpoint.

Your commission is of the belief that more money for school purposes can be made available if a uniform system of purchasing school supplies is established in the manner that is in practical operation for state institutions and departments. This can be done by the standardization and central purchase of a large bulk of school supplies. This commission has had an analysis made through the accounting department of the State Board of Control of the school supplies purchased in several of the counties of the state. This investigation shows that practically one-third of the school supplies purchased could be easily standardized for the whole state, bought in bulk and delivered in unbroken packages to the several counties.

The experience of the state has been, through actual demonstration on the part of the State Board of Control, the Superintendent of the Capitol Building and the State Purchasing Department, that from twenty-five to fifty per cent can be saved in the purchase of this character of supplies by buying them in bulk and in unbroken packages.

The total amount which is now being paid throughout the state for school supplies which can be easily standardized amounts to approximately $2,000,000. Fully one-third of this amount could be saved to the schools of the state if these supplies were properly purchased.

We suggest that a law be passed providing for the standardizing of school supplies in the different counties by the different county superintendents of schools, acting with the State Board of Education, and that the gross amount of the supplies be estimated and turned over to the State Purchasing Department for the procuring of unit prices, for delivery in unbroken packages to the several counties.

This would not throw any particular additional work upon the State Purchasing Department, which would act purely as an agent, but would, we believe, accomplish a much needed reform, especially in the matter of economy, and would leave additional funds in the several counties to be appropriated for other school purposes. The state can naturally and logically take a direct interest in the expenditure of school moneys, from the fact that so large a portion of its own revenues (aggregating over $5,000,000 annually) is apportioned for expenditure in the different counties.

CLASSIFICATION OF LANDS.

After careful study and actual field work, this commission is convinced that it would be of great value to the state, from the standpoint both of economy and equality, that the agricultural land of the different counties be thoroughly studied by experts placed in the field to gather data on all of the physical conditions entering into the matter of land value. This should include classifications of the particular soil and water conditions, definite summary of the topography and actual survey of the crop covering, of accessibility, and, in many regions of the state, a districting as to climatic conditions.

All this data, together with sales, exchanges, crop value, income, rents and other information, should be obtained and kept up to date and made a matter of record in the office of the county assessor. In that office there should be platted and tabulated all the information that is available which enters into the determination of land values under the extremely varied conditions which exist throughout the State of California. Such a study would also include the cruising of timber for the purpose of equitable taxation.

Data valuable for many useful purposes.

This data, while serving primarily for the local assessment and equalization of tax values, would also be valuable in many other ways. It would serve as a foundation for appraisements of all kinds, not only for private purposes, such as information for banks and for private individuals looking for investments, but would also serve an additional public purpose for the use of many state departments, such as the Corporation Commissioner, the Banking Department, the State Water Commission, the Insurance Department and the Railroad Commission. In addition, it would be a prime necessity if the state or the government enters into the matter of rural credits.

Inequality of assessment in the state exists despite the best efforts of the local assessor. It is usually the case that the local assessor is undersalaried for the importance of the position, and is given just enough help to put the assessments each year on the rolls, without the facility to go into the detail necessary to the determination of relative values.

The primary cause of inequality of assessment is due to the fact that the people themselves have not recognized that there is something more to an equitable assessment than the mere gathering of ownerships and hurried placing of values. They have failed to realize that the assessment of property is the most important thing in the levy of a tax, and until this fact is recognized, there will continue to exist the great inequality in the tax burden among the different property owners.

Classification of land big constructive work.

The classification of land and record of data would result in a big constructive work of inestimable value to the state. Actual surveys made by this commission have shown the tremendous importance of land classification and the placing on permanent record of the information gathered.

In the acreage surveyed we found some property not on the assessment roll. Improved orchard acreage was found to be assessed for only about half the area actually covered by orchard. Good bottom land was found to be assessed as poor land. Other discrepancies of a similar character were discovered. These are things for which the assessor is not responsible, because a classification and survey is necessary properly to establish the conditions.

The indication from our study is that the first cost would average under 5 cents per acre for agricultural land. The cost of keeping the records up to date would be negligible unless additional details were added.

For urban property, in order to produce equity, there must be the proper compilation and assembling of data, and the scientific application of some standard system of unit rule for establishing relative values.

Central supervision necessary to success.

This work, both in the cities and outside, should be done under the supervision of a central body. The problem that is of particular concern is one of gathering and recording actual physical data upon which proper values can be established. Boundary lines separating counties and districts should be disregarded in laying this foundation. Soil, water and other conditions do not run according to these imaginary boundaries. Therefore, to obtain a proper and suitable record of conditions which will be of the highest value, the work should be done as a unit throughout the territory which it is necessary to cover.

The work can not be done properly by private contract. It should be done by experts employed by the state and counties in a manner similar to that in which the federal government handles its surveys.

The expense, of course, should be distributed according to the political subdivisions traversed and divided between the state and the several counties. It will be a compilation of data which, while being used primarily for county assessment purposes, will also be utilized for the numerous other purposes heretofore mentioned. An equitable distribution of this expense would be the assumption by the state of approximately one-third of the cost.

Will reduce public and private expenditures.

This much needed work would bring about immense savings both in public and private expenditures now being made in endeavors to establish property value.

As a frontispiece to this report, there is presented a map in colors, showing the features covered in an actual field survey, made by experts, of one of the sections of land included in our investigation. This is a typical demonstration of what such a survey would place on the county records.

TAXATION OF MINES.

Practically no progress has been made towards an equitable assessment and taxation of mining properties in California. The importance of the industry demands that a sound policy be established.

This commission has made as comprehensive a study as possible, within the limited time at its command, of the matter of mining taxation. As a result of this study the following recommendations are submitted:

First—That uniformity and equity in taxation of mines be accomplished by requiring uniform information to be filed with the county assessor. That the forms and methods of accounting necessary should be prescribed and returns enforced by a central authority. That cooperation between the central authority and the local assessors can bring about as good results as special legislation or separate classification of this property through constitutional provision.

Second—Using simply the net receipts does not give the full value of a paying mine and would relieve such mines, as well as many other valuable properties, from adequate taxation. The use of the total gross or portion thereof would also in some cases make a wholly inadequate assessment, while in the case of a mine in the development stage grave injustice might be done.

Mines and assessors cooperate with commission.

Fortunately in this study we have received the hearty cooperation of the California Metal Producers Association, comprising many of the principal mining companies in the state, whose committee on taxation has devoted the better portion of two years in an examination of the situation.

We also have been fortunate in having the cooperation and assistance of the assessors from the several mining counties, and the special services of Mr. Clarence E. Jarvis, assessor of Amador County, and a recognized practical expert on mining taxation. Mr. Jarvis made a field study under authority of this commission in many of the principal mining districts of the state. His report follows this discussion.

In August last a meeting was held with the association's committee on taxation, at which time it presented a tentative plan for uniform assessment and taxation of mines. At this meeting, after an exchange of opinion regarding the method proposed, the association assumed the task of working out further detail and proposed statutes or constitutional amendments to be later considered. In the meantime this commission had the field study pursued by its expert on mining taxation.

On December 15 another public hearing was held with the committee of the California Metal Producers Association, at which were present assessors from nine of the mining counties, as well as managers and owners of several mining companies and others interested in the subject.

Lack of stability in mine assessments.

At this meeting the committee reported that further consideration and investigation had brought the Metal Producers Association to the belief that the proposed gross plan of valuation would not be just to many of the mines and that a large percentage of the mines were not in favor of the plan proposed by the association. The committee asserted that to a considerable extent under the existing conditions a fairly reasonable assessment is made by most of the present assessors, but that the dissatisfaction lies principally in the fact that with no centralization of authority and no uniform method prescribed and enforced by a central tax body the manner of assessing is liable to be changed at any time.

The committee had drawn up a proposed constitutional amendment providing a method of assessing on the net profits of the mine, which they offered for consideration if it were thought wise to propose a constitutional amendment for mines at this time.

The amendment proposed would add a new section to Article XIII of the constitution, to read as follows:

> Section 15. (*a*) The legislature shall have power, for purposes of taxation, to classify property which is the subject of taxation, to determine the basis for calculation of net proceeds derived from such property, and the net proceeds derived from property of any particular class may be used as the basis of taxation of all property belonging to that particular class; provided that all taxes shall be uniform upon the same class of subjects; and provided further, that such power of classification by the legislature shall not affect any classification of "property" or classification of "companies" or taxpayers provided for in section fourteen of article thirteen of this constitution.
>
> (*b*) For county and city purposes mining property shall be taxed at the same rate as other property in such county or city, upon an assessed valuation equalling the net proceeds of such mining property for the preceding year, plus the value of the surface improvements and the value of the real estate used for other than mining purposes..

After a discussion of the proposed amendmemnt it was the consensus of opinion of both the mine representatives and the assessors that the proposal to allow the legislature the power of classification of property and a special restriction on the valuation for taxation for mines, would not meet with popular approval because of the fact that many other classes of property could just as legitimately ask for special restrictions, and the necessary mass of detail to cover such a proposal for the constitution would render the whole scheme impractical. It was objected to also on the ground that the method would not allow a proper assessment on mines that were producing no net returns.

Central control of assessments favored.

It was the sense of the meeting, however, that under the present constitution uniform methods of submitting information to the assessor could be accomplished which would to a great extent aid in a more equitable assessment of property. It was advocated both by the assessors and the mine owners that a central authority should prescribe forms and methods of accounting which would be of considerable aid to the local assessors and bring about a more uniform practice in mine assessment, resulting in more equitable taxation.

The special report by Mr. Jarvis, this commission's mine taxation expert, formed a basis for much of the discussion and the results of his study and the findings made by him were generally accepted by those present. His report follows.

MINES AND MINING CONDITIONS.

SUTTER CREEK, November 30, 1916.

To the State Tax Commission,
Sacramento, California.

GENTLEMEN:

Having been appointed a special representative of this commission to investigate and report upon mines and mining conditions in the State of California, with particular attention to the assessment and taxation of mining properties, I beg to submit the following report which covers 38 days field work, the allotted time for this survey. Although the time was short, I have endeavored to cover as much of the mining industry as was possible to get a general idea, as to what should be done in reference to the uniform plan for mine taxation agreed upon and submitted by the committee on mine taxation of the Metal Producers Association of California.

The tentative uniform plan is as follows:

Assessment.

Valuation for assessment for purposes of local taxation as follows:

(A) Surface improvements on the same basis as other property in the county in which they are located.

(B) The value of mining claims and real estate, the surface of which is not used for other than mining purposes at one-quarter of the gross value at the mine of all ores, minerals or metals produced during the preceding year provided, however, that should the net value of such production exceed one-fourth the gross value, then the net value should be taken as the value of the mining claims and real estate. The net value should be determined by deducting from the gross value.

(1) The actual cost of mining and development work performed during the year.

(2) The actual cost of freight and treatment on the ore.

(3) General expenses, including taxes, insurance, welfare work, cost of workman's compensation, office expenses at both mine and headquarters, and salary of all officers engaged in the actual operation or management of the business of the mine.

(4) Depreciation to the amount of the actual decrease in value of the surface plant, where its value is not fully maintained by repairs and betterments.

(5) Allowance for depletion in accordance with the provisions of the United States revenue laws.

Tax levy.

(A) For local (county and municipal) taxes the levy should be the same as for other classes of property in the same county, district and municipality.

(B) For state taxation the levy should be one-half of one per cent on the value of the net proceeds for the preceding year, and this should be in lieu of any franchise tax whatever.

Mining property in California as defined by the law:

"The term real estate includes all mines, minerals and quarries in and under the land and all rights and privileges appertaining thereto."

Under the above definition, marble, cement, limestone, rock and other quarries are considered mining, and under the proposed method would be classed as mining property.

Minerals are classed by the State Mining Bureau under four different titles, as follows: fuels, metals, structural materials and industrial material.

If fuels, quarries, clay banks, etc., are to be classed as mining, then this class of mining property should be investigated as to its mining values for assessment valuation.

Since the Metal Producers Association of California has submitted its plan, the question arises, do its members mine for fuel, structural materials and industrial materials, and do they want their proposed plans to cover those classes of mining properties?

This should be thoroughly understood in the final adoption of a system or recommendation to the legislature.

The property included in the proposed uniform method of mining taxation should be clearly specified.

In my investigation, I assumed that only precious metals, such as gold, copper, silver, quicksilver, tungsten, coal, chrome, manganese, etc., were meant to come under the uniform plan of mining taxation.

During my field survey I was given a free rein, and shown every courtesy by the owners, managers and superintendents of the mines visited. They gave me all the information asked and volunteered any other information I might need on application.

I tried to impress on them that this investigation was for no other purpose than to get at the facts, so the State Tax Commission would be better qualified to handle the proposed plan intelligently, and the mine operators without exception welcomed the survey.

I went over the books and reports carefully. I have written a confidential report on every mine and placed the report in the hands of the State Tax Commission for their guidance.

The report shows the capitalization of each mine, number of shares issued and sold, price per share, franchise tax paid, its net earnings or its loss, the kind of ore mined, amount of developed reserve ore, its production, its value per ton, the cost of production, etc., men employed, average wage per diem, its surface value, etc. The value placed on it for county assessment by the county assessor and the amount of taxes paid, also a brief history of each mine showing actual conditions of its past and its future prospect, the conditions for or against its operation with comments by the management.

Findings.

I am convinced that some uniform method of taxing mines should be adopted, so that all assessors in the state would assess mines uniformly.

It should be drawn so that the mines should pay an equal proportion of its taxes as compared to those who pay under the general property tax. As it is I have found a wide variance in valuations in the different counties, due to various reasons.

I will briefly call your attention to some facts, that should be considered in the discussion of this proposed uniform plan.

First we can eliminate the improvements for that valuation can be easily determined, so the valuation to be most desired is that to be placed on the surface and the mining deposit. Then our next step is to find out how we can determine the true assessable value of the surface and the value of the mineral deposit, so that mining property will contribute its just tax burden. It should not be hard to get at a surface valuation for the surface can be easily appraised and should be appraised as other property of a similar character in the same revenue districts.

Mining of some kind is carried on in most every county of the state. Some ore deposits are in rough rugged country where land is of small value, some are on fine fruit, farming and grazing lands where values are good. Then too, many mines are situated in the city limits where the surface has a city lot value; some mines own the mineral rights under the surface both in and outside of cities where the owner of the surface pays a surface tax, and the mine owner a tax on mineral right.

By investigation I find that a mine only works on an average in an area of 20 acres, yet the mine owner owns many acres of land and numerous claims not working which if operated may be brought into a producing claim. These claims should have a mining value, which should include the surface value.

The taxation question is intensely local and should be adjusted to local conditions that surround the property.

That a tax should not be such as to induce people to hold valuable properties or cease operations.

At present there is a sincere desire on the part of mine operators and tax officers alike to discover the facts and equalize the tax burden. The mine operators realize within the local county at least there is little gained by attempt at concealment of true conditions and the financial condition of the mining company.

The capitalization of a mine according to its state incorporation report should not be a basis for assessment. For one example a mine capitalized at $3,750,000 with all shares sold, shows no production or value only for its surface. It pays but $18.00 franchise tax. This is true in many instances, some mines at low capitalization show great earnings. Stock value therefore is speculative and should not enter into a conservative appraisal.

Banks ask higher rates of interest on mines for they are considered a bad risk.

It is hard to determine the value of a mine under the general property tax for few mines are sold, so the market value can not be readily determined.

While the value of a mine could be determined to some extent by a thorough examination of ore bodies and drilling this would be no more than an intelligent guess and although it may be diligent and scientific, it is guess work still.

Some claims are held for a high price and are kept idle because buyers cannot be found to operate them. These claims are generally held by people who can afford to hold them. This class of property should be taken care of by a special provision.

I believe it can reasonably be asserted:

That an unprofitable mine has some value or it would not be operating.

That prospects must be assessed more or less arbitrarily upon judgment of the assessor as to what properties of this type would actually bring.

That royalties should be taxed as profits.

That a tax on proceeds is a certainty and should be such that it would encourage efficient operations, systematic exploration, development and production of the maximum total tonnage from each deposit.

That the realty in the various mining districts varies with the value of the mines. This has been demonstrated where mines have been abandoned, unless other industries can support the local population.

It is a fact that many towns in the mining counties could not exist if the mining industry should cease permanent operations.

That each mine visited presented some condition that entered into valuation so that all ideas should be discussed and considered.

That you will meet with some difficulty in adopting a plan that will cover all the different mining industries alike unless you have a graduate tax or a plan with some elasticity.

For instance a gold mine is operating first as a prospect, then it becomes a producer, but not of sufficient amount to pay a dividend, the owners have spent $100,000 for the property, $200,000 in development and improvements. Here they have an investment of $300,000. That in some cases has been brought into a county to develop it. Gold has a standard value, this mine has a low grade ore, but it creates an output of say $100,000 in gold which goes into circulation and has a purchasing value, although it was produced at a loss, it is new wealth. (Here is where operators do not want to be taxed for the privilege of losing money.) But if this mine is to pay it must have rich ore that will pay a profit. So the company carries on development work year after year in the hopes of better paying values, this it must do in order to save its initial investment, if it is possible, otherwise it is lost. So a gold mine as a rule works all the time, and keeps up a steady production at a loss or a profit, so it would be taxed every year as a mine or at some value.

If a gold mine show great net earnings its tax multiple I believe should be more and in proportion to its earnings.

If you will take the other metal mines, for instance, copper. Its product fluctuates in price, when the price of copper is so low it can not be mined at a profit they can close down the mine or hold its product for better values.

Naturally when copper is high there is a great production and at the present time the profits are large. At the present price of copper many low grade claims can work at a profit. So you see when copper mines are idle the gold properties are producing all the time, therefore copper is always valuable, for it can be worked at a profit some time.

But gold ore, if the value is too low to market at the standard price, is really of no value for assessment purposes other than a surface value. That value should be of the same relative value as other lands adjoining it.

By my field report you will note some of the conditions on copper mines—for instance, some smelters are operating at mines—other mines are shipping ore to outside smelters. This cuts the net and also cuts out to some extent the smelter improvements for assessment. Then some copper companies have smelters but can not smelt their ores on account of injunction due to smelter fumes, this also limits to a certain extent the production of profitable ores.

In copper mining they use saliceous ores that carry gold, also limestone, etc. These sometimes come from other counties, and if mined by copper companies operating smelters elsewhere, there should be some value placed on the mine in county that furnishes the product if a proceeds method is adopted.

Leases should also be given careful consideration and should be included in the plan. I found instances where lessees are making big returns; at present I am inclined to think you can only hold the claim for assessment—the lessee should be reached in some manner on their earnings for the owner of the claim only receives a small percentage of earnings.

That copper and other mines whose prices fluctuate should not be classed with gold mines.

That under the gross and net earnings method strikes must be considered, for in every instance it will reduce the earnings be they gross or net, no matter how valuable be the mining property.

That gold mines are operating at the present time at a greater cost of materials than in the past with gold remaining at the same standard value. To encourage this class of mining should the state allow them an exemption write-off on valuation for assessment?

Some mines own their own water rights, which are valuable, as well as power plants, and in addition to their using them for mining purposes sell water and power to other companies, charging themselves at cost.

This case was brought to my notice. A mine having run at a loss for several years, not even paying its interest on borrowed money (some of it being used for paying taxes), cleared about $150,000 last year, which it paid to creditors. Management wonders would this be gross or net for assessment.

I also found one instance where a mine with large improvements and land holdings was deeded to the state for taxes. The mine is now operated again and the assessor has replaced it on the county rolls, while the state still holds a deed to it.

The gold mines in some of the counties have built expensive concrete dams to impound tailings that they may keep the tailings from the streams. Should these dams be assessed as improvements?

Gold dredging is a class of mining that should be considered separately, for in many instances it destroys what was valuable bottom lands.

If a method of production is used for assessment purposes, then a uniform system of mine accounting and reports to the taxing authorities should be rendered in order to secure justice among the mines in appraising them for taxation purposes. It is obvious that uniform methods must be followed at least in so far as the accounts affect the reports filed with the taxing authorities showing deductions to be made in order to determine the net. The tendency should be to refrain from interfering in any way with the records of the operators so long as the data desired is accurate and complete.

Improvements on abandoned mines should be assessed at salvage value only.

The mining companies incorporated in England have to pay to that country a tax on the net earnings and in some instances foreign officers' salaries. These should not be allowed as a deduction to determine the net. It is unfair to local operators in same revenue districts.

A gold mine may be producing a large tonnage of low value ore and require large capital investment, may earn annually small profit, while gross value may be same as that of product of a high-grade mine with small investment. Gross value here will not measure justly.

When a shaft is out of the city limits and the ore body is under city limits, where should the value be placed or how divided?

The franchise tax should apply to all individuals owning mines or else be written off the statutes. If franchise tax is only placed on net mines, state will lose much revenue.

As all mines are mostly located in a rough mountain country and a natural resource I believe the franchise tax should go to the counties wherein the mines are located. Gold mines have no good will and why should they pay a franchise tax. It can not go in the open market with copper, lead, zinc, etc.

I recommend to the commission that they should call a meeting of all the county assessors of the mining counties and get them together and discuss the new proposed method. Many of them are armed with ideas and practical mining knowledge and the conditions that surround it in their counties.

I feel this field survey of the mining situation will be the starting of a better system of mine taxation; it has shown up inequalities in assessment, also some very interesting facts.

But before a change is made, we should proceed slowly and with a definite knowledge of what the results will be.

Allow me to suggest that every phase of the proposed plan should be studied out, carefully considered, discussed and sifted as to its merits, and if it is practical and just to all it will stand the crucial test of an ever-watchful public.

In conclusion, I would suggest now that the Tax Commission has some data, that it would be wise for the Metal Producers to have another hearing with the Tax Commission for the purpose of a better understanding of the plan.

I trust that I have been of some service to the commission. At any time I will give you any knowledge or ideas that I may possess as soon as called upon to do so.

Thanking you for the appointment as special mining representative of your State Tax Commission, I am

Yours respectfully,

Clarence E. Jarvis.

TAXATION OF TIMBER.

The subject of the taxation of timber involves questions more perplexing, probably, than those connected with the taxation of other natural resources, such as minerals, fuels and water power.

Included with the subject of taxation of timber is the question of its development or replacement by reforestation and its permanent retention by scientific logging.

The fact that it has been considered a one-crop product of the soil has lent much impetus to the idea that the timber itself should not be taxed more than once, and that at the time it is cut. It is claimed that its continued taxation year after year forces wasteful cutting and unscientific denuding of the forest area; that if it can not be cut and marketed the tax is an unjust burden upon the owners of the property.

If timber were in state or government ownership it would not, of course, be taxed. Much of it, however, is in private ownership and forms a considerable part of the taxable properties of the counties in which it is situated. A change in policy of taxation on timber to one, for instance, of leaving it untaxed until cut, would seriously disturb the question of revenue in the several counties.

Investments in timber property have taken the same hazard of recovery of capital and interest as investments in other natural resources and in other forms of property. These investments, however, have been made under contract of ownership with the government under the supposition that the rights and title acquired would receive equitable treatment. No form of special legislation should be permitted that would bring an unjust burden upon this form of property.

On the other hand, however, under our constitution timber is taxable according to its value, as are other forms of property. It is only equitable that it should bear its proper proportion of the tax burden and that the burden should be distributed fairly between the different owners of timber land. Under our present method of assessment such equity is not preserved. In order to bring about equity between different timber owners and other forms of property definite and reliable information as to relative values should be established. In another part of the report we recommend the classification of land, the unit valuing for urban property, the cruising of timber and better methods of valuing mines and other forms of property. A proper foundation study of this kind will not be too expensive when we consider the fact that one study will make practically a permanent record for years.

By this method all of the elements that enter into the value of timber, such as quality, cost of lumbering, cost of transportation to market, etc., will be established. The establishment of these fundamental facts will assure an equitable assessment and a proper placing of the tax burden. If as a result, too severe a burden is placed upon the timber interests, there will have been established a basis upon which a more equitable system of timber taxation can be constructed.

This commission has been in conference with various timber men, who have not reached any common ground of agreement as to procedure. We are still in the process of conference with them, and expect to report later in the session regarding the results.

We are fortunate in being able to present in this report a discussion on the problem of timber taxation by Mr. Miles Standish, who has had years of practical experience in timber matters.

There is also presented in tabulated form elsewhere in the report a statement of the result of an examination of a number of cruisings of timber properties in several of the counties of the state.

PROBLEM OF TIMBER TAXATION.

State Tax Commission,
Sacramento, Cal.

GENTLEMEN:

It would seem any investigation covering state resources for tax producing purposes, would also carry with it a like demand for investigation of the result of the taxation upon these resources and its relations to the general welfare of the state.

There is probably no natural resource, which is of such general use to the different occupations and operations carried on in the state, as the product of the forest, and no product, whose cost to the consumer is more affected by transportation charges, hence no natural product to which more attention should be paid toward its conservation and increase or renewal.

Natural resources are divided into three classes: those which are once used and can not be replaced, as coal, oil, iron; those which are capable of being renewed after a long interval, as timber; and those capable of being used again and again and are always with us, as water power.

Of the 100,000,000 acres in the State of California, some can be best used for the growth of fruit, others for grain, others for mining and still other great districts, where the growth and reproduction of the forest is certain and any other crop, experimental.

Approximately 12,000,000 acres is the greatest amount which has been plowed and of this only 2,500,000 acres is irrigated. The forests of California are estimated to contain about 11,000,000 acres, belonging to the government, and 5,000,000 in private ownership, all capable under wise administration of bearing a reasonable share of the tax burdens of the commonwealth and yielding an annual timber crop at fair prices to consumers in the state, or if the tax burden becomes too great and forced thereby to cut and market, it will yield but one slovenly and wastefully cut crop, the lands then reverting to a frequently fire-swept wilderness.

That the time is nearly reached when such forced cutting will be compelled, is shown by study of ''taxation of timberlands'' made by the federal forest service of September, 1915, a copy of which is attached. This shows the cost of pine timber figured at the time of survey and opening to purchase at $2.50 per acre, together with interest and charges to date of report to amount to, in various districts, respectively: $35 an acre, $1.75 per thousand; $34 per acre, $1.70 per thousand; $20 per acre, $1 per thousand, and in the redwood district, $52.50 per acre, per thousand $1.31.

So far as redwood is concerned, I feel both the timber acreage and average amount of timber per acre allowed is much too high, in that insufficient allowance is made for nontimber-bearing acreage.

With pine timber, the annual tax paid (presumably for 1915), was $765,740.00, which, with an output of approximately 600,000,000 feet amounts to $1.30 per thousand, and with redwood output 500,000,000 feet, tax paid $601,991.22, $1.20 per thousand feet, or the stumpage cost of the timber cut, is absorbed in carrying the uncut stumpage, much the greater portion of which is unavailable until transportation is provided.

This would seem to mean, unless stumpage values can be increased, and they have not increased, but on the contrary actually decreased since about 1907, and moreover the per capita consumption of lumber has also decreased, that with stumpage stationary, with present tax equal to stumpage cost of timber cut, and the yearly cut absorbed in carrying unavailable timber, with taxes rapidly increasing (in some counties, a raise of 50 per cent in one year, due to increase in valuations), the natural result would be forced, wasteful cutting or loss of property to the owner by taxation.

What is the cure which will conserve the forests, allow reforestation and still give the state its fair share of revenue?

One remedy proposes the taxation of timber when cut, the land bearing this crop to be taxed separately at its value for this or other purposes.

To this theory the following queries might be directed:

If transportation is at hand and the timber mature, should it be allowed to be held, taxed at such a low rate as would deprive the state of needed revenue and allow the owner to reap benefits upon more favorable terms, than is allowed other property capable of being used?

Is not orchard valuation after trees are a certain age, made up of both land value and tree value? If the orchard does not produce a yearly crop, still that valuation is held.

Should not timber land be taxed as it is classified—namely, a natural resource—if undeveloped and lacking transportation (which is necessary for its use), the timber at a nominal figure to be added to the land value? This would prevent the necessity of sacrificing a resource, that should be kept for the benefit of the public until such time as it could be profitably used; this would also allow reforestation. In this connection, is it fair one rule be used for the privately owned timber land, another for the federal ownership?

Are there no means whereby revenue can be obtained by the state from the federal owned timber?

Would a yield tax of so much per thousand on all cut timber, both federal and privately owned, aid in this purpose? The privately owned land upon which there is an immature growth, should be exempt from taxation until it arrives at a mature state, which would put the public and private ownership on an equality in that respect.

Values, of course, are largely based upon estimates of earning power; there is no earning power in timber land too far removed from transportation to allow its use, excepting perhaps for the small use it has as a stock range.

Undoubtedly timber has a speculative value, based on the hope transportation will come and the time within which it will be available or perhaps if the tract be large enough, the cost of furnishing such transportation.

It does not seem to me, with any other class of property, is this speculative value so closely and erroneously taken by the assessor for the cash value used for assessment purposes.

The assessor in one county of large timber resources has attempted to use general classifications—as timber lying close to water, rail, or wagon transportation, one class; a good stand of timber without transportation, another and lower class; still lighter stands, and the partially timbered section, merging into the open or brush land and without transportation, a third class.

This method seems to be working well and would need no change in present laws, only recognition of conditions as they actually are and not a blind blanket assessment as is too often used.

Much has been said regarding the necessity of having timber estimated for assessment purposes, a work involving heavy expense. It is forgotten, quantity is only one of several determining factors for value.

First and foremost comes transportation, next quality and quantity, both equally important.

To my mind, a soil analysis of a ranch and classification of the soils, thereon, an inventory of a stock of goods, a blocking out of ore bodies, are as essential as timber estimates and perhaps these may all come in time.

To sum up, it would seem an annual yield tax, if large amounts of timber were in the future to be cut from the federal and privately owned lands, would have advantages. It is doubtful, however, if the federal forests, for many years will yield large revenues, as at present the federal timber cut in California is only about four per cent of the total cut in the state. Such a plan would undoubtedly seriously diminish the revenue of many timber counties, where the annual amount cut is small compared to that standing, and some means would have to be devised to equitably apportion the yield tax among the various counties, which would undoubtedly require the state taking over timber taxation and reimbursing the counties for loss of revenue therefrom.

Probably much can be done toward bringing a better condition under the present laws by more intelligent study of conditions. This would not, however, solve the reforestation problem, the importance of which is evident when one considers about one-fourth the privately owned timber land of the state now lies cut and denuded.

Respectfully,

MILES STANDISH.

December 22, 1916.

Following is the study of taxation of timberlands and resultant carrying costs, as set forth by C. Stowell Smith in his report for the Federal Forest Service:

Pine.

Fifty-eight timbered townships were selected at random in a belt beginning in northern Plumas County and extending south through the Sierra pine belt to Tuolumne County. The dates of approval of the surveys of these counties by the General Land Office were ascertained and prorated against the number of townships approved under each date, with the result that the average date of approval was 1875. This establishes the date upon which the government sale value of $2.50 per acre became effective. Bringing this date forward to 1914 with 7 per cent carrying charges gives a value per acre of $34.98. Assuming an average stand per acre of 20,000 feet of timber, the present value per 1000 would be $1.75.

The townships selected and the dates upon which the surveys were approved are—

T. 21 N., R. 6 E., M. D. M., 1885.
T. 23 N., R. 6 E., M. D. M., 1875.
T. 24 N., R. 6 E., M. D. M., 1885.
T. 28 N., R. 6 E., M. D. M., 1875.
T. 23 N., R. 7 E., M. D. M., 1875.
T. 28 N., R. 7 E., M. D. M., 1867.
T. 24 N., R. 7 E., M. D. M., 1881.
T. 22 N., R. 8 E., M. D. M., 1885.
T. 23 N., R. 8 E., M. D. M., 1885.
T. 24 N., R. 8 E., M. D. M., 1881.
T. 27 N., R. 6 E., M. D. M., 1875.
T. 17 N., R. 9 E., M. D. M., 1874.
T. 18 N., R. 9 E., M. D. M., 1874.
T. 19 N., R. 9 E., M. D. M., 1878.
T. 22 N., R. 9 E., M. D. M., 1885.
T. 23 N., R. 9 E., M. D. M., 1885.
T. 24 N., R. 9 E., M. D. M., 1880.
T. 16 N., R. 10 E., M. D. M., 1874.
T. 17 N., R. 10 E., M. D. M., 1874.
T. 18 N., R. 10 E., M. D. M., 1874.
T. 19 N., R. 10 E., M. D. M., 1878.
T. 24 N., R. 10 E., M. D. M., 1872.
T. 12 N., R. 11 E., M. D. M., 1871.
T. 13 N., R. 11 E., M. D. M., 1871.
T. 14 N., R. 11 E., M. D. M., 1871.
T. 15 N., R. 11 E., M. D. M., 1871.
T. 16 N., R. 11 E., M. D. M., 1866.
T. 12 N., R. 12 E., M. D. M., 1874.
T. 13 N., R. 12 E., M. D. M., 1875.
T. 14 N., R. 12 E., M. D. M., 1875.
T. 15 N., R. 12 E., M. D. M., 1875.
T. 16 N., R. 12 E., M. D. M., 1874.
T. 12 N., R. 13 E., M. D. M., 1875.
T. 16 N., R. 13 E., M. D. M., 1875.
T. 3 N., R. 14 E., M. D. M., 1875.
T. 4 N., R. 14 E., M. D. M., 1876.
T. 5 N., R. 14 E., M. D. M., 1874.
T. 6 N., R. 14 E., M. D. M., 1874.
T. 7 N., R. 14 E., M. D. M., 1878.
T. 9 N., R. 14 E., M. D. M., 1875.
T. 10 N., R. 14 E., M. D. M., 1875.
T. 3 N., R. 15 E., M. D. M., 1881.
T. 4 N., R. 15 E., M. D. M., 1887.
T. 5 N., R. 15 E., M. D. M., 1874.
T. 6 N., R. 15 E., M. D. M., 1874.
T. 7 N., R. 15 E., M. D. M., 1876.
T. 8 N., R. 15 E., M. D. M., 1876.
T. 10 N., R. 15 E., M. D. M., 1876.
T. 1 N., R. 17 E., M. D. M., 1880.
T. 2 N., R. 17 E., M. D. M., 1880.
T. 1 N., R. 18 E., M. D. M., 1880.
T. 2 N., R. 18 E., M. D. M., 1880.
T. 27 N., R. 4 E., M. D. M., 1879.
T. 24 N., R. 5 E., M. D. M., 1878.
T. 25 N., R. 5 E., M. D. M., 1879.
T. 27 N., R. 5 E., M. D. M., 1877.
T. 28 N., R. 5 E., M. D. M., 1875.
T. 29 N., R. 5 E., M. D. M., 1885.

Twenty-nine timbered townships were selected at random in a belt beginning in Tuolumne County and extending south through the timber belt in Tulare County. The average date of approval by the General Land Office of these surveys was 1880. Assuming the same stand per acre an average value per acre of $33.93 or $1.70 per 1000 feet in 1914. The township locations and dates of approval are the following:

T. 1 S., R. 17 E., M. D. M., 1877.
T. 2 S., R. 17 E., M. D. M., 1877.
T. 3 S., R. 17 E., M. D. M., 1885.
T. 1 S., R. 18 E., M. D. M., 1880.
T. 2 S., R. 18 E., M. D. M., 1877.
T. 3 S., R. 18 E., M. D. M., 1885.
T. 4 S., R. 19 E., M. D. M., 1885.
T. 4 S., R. 20 E., M. D. M., 1884.
T. 5 S., R. 20 E., M. D. M., 1878.
T. 5 S., R. 21 E., M. D. M., 1875.
T. 6 S., R. 21 E., M. D. M., 1880.
T. 7 S., R. 21 E., M. D. M., 1875.
T. 6 S., R. 22 E., M. D. M., 1874.
T. 7 S., R. 22 E., M. D. M., 1878.
T. 8 S., R. 22 E., M. D. M., 1878.
T. 8 S., R. 23 E., M. D. M., 1878.
T. 9 S., R. 23 E., M. D. M., 1881.
T. 9 S., R. 24 E., M. D. M., 1881.
T. 10 S., R. 24 E., M. D. M., 1881.
T. 9 S., R. 25 E., M. D. M., 1881.
T. 10 S., R. 25 E., M. D. M., 1881.
T. 11 S., R. 25 E., M. D. M., 1881.
T. 12 S., R. 25 E., M. D. M., 1885.
T. 13 S., R. 25 E., M. D. M., 1879.
T. 10 S., R. 26 E., M. D. M., 1881.
T. 13 S., R. 25 E., M. D. M., 1879.
T. 13 S., R. 27 E., M. D. M., 1879.
T. 14 S., R. 27 E., M. D. M., 1879.
T. 15 S., R. 27 E., M. D. M., 1883.

Sixteen timbered townships contiguous to the upper Sacramento Valley selected at random show an average date of approval of 1883.

On the same basis as the foregoing the 1914 value per acre would be $20.36, and per 1000 feet $1.01. The original data are the following:

T. 38 N., R. 1 W., M. D. M., 1883.
T. 40 N., R. 1 W., M. D. M., 1883.
T. 41 N., R. 1 W., M. D. M., 1883.
T. 38 N., R. 2 W., M. D. M., 1883.
T. 36 N., R. 3 W., M. D. M., 1883.
T. 37 N., R. 3 W., M. D. M., 1883.
T. 38 N., R. 3 W., M. D. M., 1883.
T. 44 N., R. 3 W., M. D. M., 1881.
T. 45 N., R. 3 W., M. D. M., 1881.
T. 36 N., R. 5 W., M. D. M., 1881.
T. 37 N., R. 5 W., M. D. M., 1884.
T. 39 N., R. 5 W., M. D. M., 1883.
T. 40 N., R. 5 W., M. D. M., 1883.
T. 35 N., R. 6 W., M. D. M., 1882.
T. 36 N., R. 6 W., M. D. M., 1884.
T. 37 N., R. 6 W., M. D. M., 1887.

Accepting the minimum figure of $1.00 per 1000 as the 1914 value of stumpage in the pine region as established by the government through sales under the Timber and Stone Act, and an estimated stand of 146,200,000,000 feet of privately owned timber in California (except redwood—B. of C. Report, Vol. 1, p. 70), the annual carrying charge per 1000 on the present normal production (400,000,000 feet per year) is $25.60, or a total of $10,234,000. The above estimate was made in 1908. A subsequent cut of about 2½ billion feet, however, will only reduce this charge $0.44.

Comments (Pine).

(1) Carrying charges should not be computed on the "value" of stumpage but on the amount of the accumulation from investment, taxes and interest. The average accumulation from the above figures, $34.98, $26.89 and $20.36 per acre, would be $27.40 per acre. The interest on this at 6 per cent would be $1,664 per acre, or $5,827,312 on the total acreage of pine timber.

The actual annual taxes are $765,740, making total carrying charges $6,693,052.

(2) This is too high. The 3,556,388 acres assessed as pine timber at 30,000 feet per acre, would carry 105,000,000,000 board feet of standing timber.

(3) This is too low, the normal production being 600,000,000 board feet per year. This into the total carrying charges gives an annual carrying charge of $11.15 per 1,000 on the lumber sawed.

NOTE.—Brief on taxation of timberlands for federal trade commission makes this $10.08 per 1,000, or $1.07 per 1,000 less.

Redwood.

Twenty-seven timbered townships were selected at random in a belt beginning in the northern Humboldt County and extending south through the redwood belt into Mendocino County. The dates of approval of the surveys of these counties by the General Land Office were ascertained and prorated against the number of townships approved under each date, with the result that the average date of approval was 1869. This establishes the date upon which the government sale value of $2.50 per acre became effective. Bringing this value forward to 1914 with 7 per cent carrying charges gives a value per acre of $52.50. Assuming an average stand per acre of 40,000 feet of timber, the present value per 1,000 would be $1.31.

The townships selected and the dates upon which the surveys of the bulk of each were approved are:

Number	Township	Range	Year	Number	Township	Range	Year
1	21 N.	17 W., M. D. M.	1870				
2	17 N.	16 W., M. D. M.	1878	15	12 N.	2 E., H. M.	1889
3	18 N.	16 W., M. D. M.	1867	16	9 N.	1 E., H. M.	1876
4	18 N.	17 W., M. D. M.	1867	17	8 N.	1 E., H. M.	1875
5	17 N.	15 W., M. D. M.	1868	18	8 N.	2 E., H. M.	1876
6	17 N.	16 W., M. D. M.	1866	19	7 N.	1 E., M. M.	1873
7	16 N.	15 W., M. D. M.	1868	20	7 N.	2 E., H. M.	1882
8	16 N.	16 W., M. D. M.	1867	21	6 N.	1 E., H. M.	1855
9	18 N.	1 E., H. M.	1884	22	6 N.	2 E., H. M.	1874
10	17 N.	1 E., H. M.	1884	23	5 N.	1 E., H. M.	1855
11	16 N.	1 E., H. M.	1884	24	5 N.	2 E., H. M.	1874
12	15 N.	1 E., H. M.	1884	25	3 N.	1 E., H. M.	1872
13	14 N.	1 E., H. M.	1882	26	3 N.	2 E., H. M.	1876
14	13 N.	2 E., H. M.	1889	27	3 N.	1 W., H. M.	1856

Accepting $1.30 as the value of stumpage in 1914 in the redwood region as established by the government through sales under the Timber and Stone Act and an estimated stand of 101,900,000,000 feet of privately owned redwood in California (B. of C. Report, Vol. L, p. 70), the annual carrying charge per 1,000 at 7 per cent on the present normal production (500,000,000 feet) is $14.26, or a total of $7,133,000. The above estimate was made in 1908. A subsequent cut of about three billion feet, however, will only reduce this charge $0.42.

Comments (Redwood).

(1) This is too high. There are 1,424,122 acres assessed as redwood timber land in California. At 60,000 board feet per acre (too high) this would give a total stand of 85,000,000,000 board feet.

(2) Interest at 6 per cent on $52.50 is $3.15 per acre annually (1914), which would be $4,485,984.30 on the total acreage of redwood timber lands (1,424,122). The actual taxes (1914) were $601,991.22, making total carrying charges $5,087,975.52. This is $3.57 per acre annually (brief for federal trade commission makes it $3.20 an acre), or $10.17 per 1,000 on the present normal production of 500,000,000 board feet. (Brief makes this $9.12 per 1,000.)

(3) At 60,000 board feet per acre this would give a valuation of $0.87 per 1,000 of standing redwood timber, instead of $1.31 per 1,000. (Brief makes this $0.776 per 1,000.)

TAX LIMITATION LAW.

One of the necessary advances toward equitable taxation is a full value assessment for taxable property. The greatest hindrance to full value assessment, not only in this state but also in every other state in the Union, has been the absence of a proper control of tax levies.

Obviously, it would be unwise to disturb the present percentage of assessed values unless at the same time a complete and positive control in the limitation of tax levies is placed upon the statute books. It has been the experience of every state, where no limitation laws have been in existence, that a sudden change from a partially assessed value to a fully assessed value has greatly increased tax burdens.

This commission would recommend a tax limitation law similar to the one now in successful operation in New Mexico, with modifications to accord with conditions in this state. The New Mexico statute is short and simple, and in only a few minor ways open to misinterpretation.

Briefly, it provides that no county, city, town, village or school district shall in any year make tax levies which will in the aggregate produce an amount more than five per cent in excess of the amount produced by tax levies in the particular political subdivision during the preceding year, except that in case the amount desired to be produced by taxation exceeds five per cent, then such fact shall be set forth in the form of a special request and filed with the central tax authority.

The decision of the central tax authority under the New Mexico statute is final. The law in question is clear and effective and so simple that any one can very readily determine in a few minutes whether or not the local authorities in a given political subdivision are imposing a tax in excess of what the law allows.

Ultimate power should rest with the people.

The New Mexico statute is faulty in one regard; that is, in leaving the final decision to the central tax body. The people of the community, if they so desire, should have the right finally to settle the question of the burden of tax they shall bear and the matter of raising additional revenue for urgent needs. The check on the local authorities by a central body is wholesome, and will result in needed economies in local expenditures. But there should be no arbitrary check on the wishes of a majority of the people of a particular community.

Another important modification of the New Mexico law recommended by this commission is that the limitation law should apply to counties, but that the cities and towns should have the privilege of coming under the tax limitation law. Cities and towns should be permitted to come under the law by direct action of the governing body, by petition of a percentage of the voters acted upon by the governing body, or by a vote of the people in the event that the governing body does not act voluntarily.

Thomas S. Adams, of Cornell University, and formerly with the Wisconsin Tax Commission, in an address delivered at the Association of Life Insurance Presidents in New York City on December 15, 1916, in speaking on tax limitation laws said:

"In a similar way we have developed a new form of tax limit law. We have had hundreds of such laws on our statute books for decades, but they have failed almost universally to check expenditures because they attack the problem in a wrong way. Very recently a new type has been introduced in Colorado, New Mexico and other states which works. The defect of the old type lay in the fact that the limit was imposed upon the rate of taxation. This rate had to be high enough to fit exceptional cases and it was therefore too large for the typical municipality. Moreover it could be evaded by manipulating the total assessment. The new type limits the increase of the total tax levy; supplements this with a prohibition of bond issues designed to be evaded on taxation limitation; provides some trustworthy board or authority, which is empowered to suspend the limit in case of emergency or urgent necessity. Such laws do get results. Their efficiency, however, is confined largely to the local government, although limitations upon state taxes also exist in some commonwealths."

FULL VALUE ASSESSMENT.

With the proper control of tax levies guaranteed by sufficient limitation law there should remain no hesitancy in bringing about a full value assessment of property for taxation purposes. The full value assessment would accomplish four main results:

First—It would bring about equity in valuation as between different property owners.

Second—It would eliminate any necessity for the present absurd practice of double assessment in incorporated cities.

Third—It would accomplish much needed economy.

Fourth—It would give every city and county a higher financial standing, by showing the true wealth of the community, which is more than double the present assessed value.

At the present time the taxpayers of the incorporated cities are put to the expense of approximately $300,000 a year to make an assessment which is a duplication of the assessment made by the county assessor. This amount of money, if properly used, would go a long way toward putting in a scientific basis of assessment at full value, and after the installation of such methods of assessment in municipalities there would be saved the additional cost which they are now paying, in most instances, toward an inadequate and inequitable assessment of property.

With better foundation for assessment and a full value assessment established, much economy could be accomplished by having real estate assessments made less frequently than every year. A reassessment would not be necessary oftener than every three or four years except in minor corrections.

As typical of suggestions made to this commission from different parts of the state regarding full value assessment and central control of such assessments we print the following recommendation made by the committee on taxation of the Oakland Chamber of Commerce:

The State Tax Commission,
Sacramento, California.

GENTLEMEN:

The committee on laws and legislation of this organization has given the text and questionnaire of your commission of August 1st its most careful consideration, and I am directed to send you the report of this committee which has had the endorsement and approval of the board of directors of the Oakland Chamber of Commerce.

The report of the committee, which was submitted over the signature of its chairman, Dr. George C. Pardee, is as follows:

"That for the present no change of any kind be made in the system of taxation in vogue in this state; that the entire energy of the commission be directed to devising a more uniform method of assessment which will result in the application of scientific principles in an equitable manner; that as part of such plan the assessing power should be centralized in a state board or commission for the double purpose of—

(A) Removing the assessing of real property from local political influences.

(B) Making a uniform standard of assessment throughout the entire state.

It is particularly important in connection with the development of the state that a uniform method of assessment be used so as to afford a basis of comparison of the relative values of land in the state. This will readily result from the assessment for the full 100 per cent of the market value of the property."

The committee on laws and legislation of this organization consists of the following:

Dr. George C. Pardee, chairman,
Charles E. Snook, vice-chairman,
Jos. R. Knowland,
Percy C. Black,
J. H. Brown,
A. P. Holland,
H. S. Robinsin,
R. J. Montgomery,
Chas. A. Beardsley,
Clifton E. Brooks,
Ezra Decoto,
W. H. L. Hynes,
Roscoe D. Jones,
George W. Reed,
Edw. J. Tyrrell,
Earl D. White,
Paul C. Morf,
Milton Schwartz.

Very truly yours,

JOSEPH E. CAINE,
Managing Director Oakland Chamber of Commerce.

TAX ON EXCESS LAND VALUES.

The increasing difficulty and hardships attendant upon the attempts of individuals of small means to procure, retain and develop a reasonable land holding for farm, residential or business purposes, and the continued holding of land values in large ownerships in this state indicates that something is fundamentally wrong with our land economies.

This is not primarily a problem to be solved simply by taxation methods. The Commission on Land Colonization and Rural Credits has made an extremely comprehensive and valuable report upon the conditions and needs from the standpoint of the agricultural districts. The matter of taxation can play only its part in the whole scheme.

There were pointed out in a preliminary report by this commission some of the reasons why the land problem in California was more difficult than in many of the states. Two extreme ideas are manifest in our body politic regarding land holdings. On the one hand, the old idea of unqualified ownership and control without interference with the speculative features of land ownership, and on the other the extremely radical views that would disregard altogether property rights and confiscate all land values, regardless of the equity of private ownership.

Strengthen wholesome private ownership.

This commission, it can be stated at the outset, is unalterably opposed to the destruction of the principle of private ownership in land. Our laws should be so shaped that wholesome private ownership in land would be strengthened and protected. Either some reasonable, normal method of accomplishing this must be undertaken, or sooner or later the people, in an attempt to remove the incubus, will adopt some extremely radical measure, such as the proposed constitutional amendment on land taxation, defeated at the general election on November 7th last. Conditions will not improve of their own initiative, and there is room for serious thought and consideration of changes in our taxation methods, which will aid in advancing toward a proper solution.

Principle of land holdings outlined.

This commission, in its previous discussion of the land problem, made the following statement:

First—The private ownership of large holdings of land unimproved and uncultivated is recognized by the constitution of this state as being against public interest, forcing as it does, the purchaser who wishes to improve his land, to pay to the holder the speculative and socially increased value of such land.

Second—The holding of large interests in improved land and the consequent accretion of value thereto because of its situation, and not because of the efforts of the owner, is also against public interest.

Third—Fundamentally, every man has the right through his labors to a reasonable living from the land, and there should be recognized a maximum value of land which he is entitled to obtain and hold at a minimum cost as long as he makes beneficial use of the same.

It was also suggested that to discourage such large holdings and encourage small holdings and to bring back to each individual in some measure a proportion of land value which he helped to create, a maximum tax be imposed upon the future increase in value of all unimproved land or land not put to any beneficial use; a lesser rate of tax in the case of land improved or being put to beneficial use; the exemption of such tax for each individual of a reasonable holding of improved or beneficially used land. This proposition was put forth for the distinct purpose of debate and criticism.

Public acceptance of principle involved.

The responses upon this particular subject, included in the questionnaire sent out by this commission to thousands of our citizens and property owners, furnish a most interesting and valuable index of public sentiment in California as to the land problems.

There is a general acceptance of the fact that private ownership of large holdings of land, unimproved and uncultivated, is against the public interest. There is also very general acceptance of the statement that the holding of large interests in improved land is to some extent also against public interest. Those who oppose an additional tax on the increment value of those lands base their opposition mainly on the ground that if the land is properly assessed, as values go up the burden of tax will sufficiently take care of a tax on the increased value.

In a measure this may be true in a theoretical sense, but practically it never has been true in this or any other country. It might to a great measure properly distribute the tax if a perfect system of assessment could be established.

But while we are anticipating a perfect system of assessment, something should be done to accomplish what nearly everyone believes should be accomplished but which has failed of accomplishment up to the present time in this and other states, because no active attempt has been made to place a burden upon large land values.

Surtax on land levied in Australia.

Australia, since 1910, has operated a graduated land tax upon all estates of an unimproved value of $24,000 and upward. Absentee landlords are taxed at a higher rate. According to a statement made by William Morris Hughes, Prime Minister of Australia, the tax has fully justified itself. It has brought in considerable additional revenue to the state and has been instrumental in this short time in breaking up many of the large land holdings which were one of the blights upon the prosperity of that commonwealth. We are fortunately able to append hereto a discussion of the Australian land laws by Mr. Niel Nielson, Australia's Trade Commissioner to America.

This commission is of the opinion that the Australian law would not be a proper and equitable method to be pursued in California. We gather from the report of the Rural Credits Commission that in most localities land values in California have reached speculative figures far in excess of those in Australia, in other countries or in other states of the United States. We do not believe that it would be just to levy a graduated land tax upon the total land value of holdings above a certain limit, for the reason that in many instances there are ownerships where the lands would increase very slowly or even decrease in value for a time, below the actual cost, and such owners would bear as heavy a burden under the graduated land tax as those whose lands were increasing rapidly.

Should not destroy individual's rights.

It may be argued that if the burden was too heavy the holdings would sooner be divided. This might or might not be true. The land must first be sought after and sold. This will not take place in the twinkling of an eye. It is not the purpose of this commission to recommend legislation which will destroy any individual's accumulated property rights. It only seeks to control for the future that to which the individual or corporation has no legal or moral right, if the state so wills. We are convinced that the most equitable tax is one which would be placed upon the future increase of all land values with a smaller exempted amount than that in Australia. We believe that a heavier burden should be placed upon unimproved large holdings than is placed upon improved holdings.

It has been argued that there would be great administrative difficulty in determining what was improved or unimproved land. It is contended that this applies alike to urban property and agricultural lands.

It would not be the idea of this commission that the law should go into any intricate detail in the definition of improved or beneficially used land. That is something that is administrative in nature and should be left to the determination of a properly constituted central tax body. We propose that urban property, which, in many instances, would include territory adjacent to but not included in incorporated limits, should be divided into two classes: First, that which has been reached by the natural development of the city and easily recognized as business or residential property; second, that territory which is partially urban but has gotten beyond classification as agricultural land. This would need a distinct treatment of its own.

Beyond these two classes would lie the agricultural lands, to be segregated into general groups, and standards established to determine whether or not they were developed within a reasonable degree of their possible beneficial use.

Timber lands should be valued apart from the growth upon them to form a foundation value upon which to determine increased value when the crop is removed.

Mineral and oil lands in private ownership should be valued as such and bear a tax upon increased value.

Desert and waste land in private ownership should carry a foundation value upon which future value may be determined.

Proposal of an equitable tax.

This commission proposes as an equitable method of levying a tax upon the increased value of land a yearly tax of one per cent upon all increases in the value of land that accrue and exist at the end of each year after the first date established, except in the case of exempted values. Also, that the assessed value as of that date be established as the foundation value upon which to determine the future increase of the lands assessed.

Any owner of land feeling that the assessed value did not properly represent the true value of the property would have the option to increase the foundation value to such figure as he might think best, but the future assessed value upon which general property taxes are levied should not be less than the foundation value which is so established.

In all cases deductions from the increased value are to be allowed for expenditures that add permanent value to the land, such as developing work, grading, filling, reclamation, irrigation, street and similar assessments.

In his analysis and discussion of the English land tax contained in this report, Carl C. Plehn points out that the increment tax there applied is not so heavy a burden on the increment as our property tax. Landlordism is much worse in England than here. It is too prevalent here, however. The remedy seems to be to apply both the property tax and the increment tax upon large holdings.

The money collected from this source should be kept in a permanent fund to be invested in securities issued for the building of roads and other similar public improvements; the development of reclamation or irrigation districts; for rural credits, or in any other way that would bring about an increase in social value which would automatically be returned to the fund. The interest collected from the investment and loans of the fund should be used in support of public schools or other general governmental purposes, thus being utilized to reduce uniformly the tax burden throughout the commonwealth.

This commission recommends, in this and other ways, that the state policy should be to build up permanent sources of revenue from foundation funds and resources operated to the advantage of the public.

LAND TAXATION IN AUSTRALIA.

Following is a discussion of land taxation by Niel Nielsen, trade commissioner to America, for New South Wales:

State Tax Commission,
Sacramento, California.

GENTLEMEN:

The people of Australia are not single taxers, but a large majority of them are firm believers in the principle of land taxation as against taxation levied either upon land and improvements in conjunction, or upon property.

The idea in our minds is that no man's industry should be taxed, but that *land* which is by right the common inheritance of the whole of the people of the nation is a proper subject for taxation.

We in Australia levy land taxes with three objects in view:

First—To secure revenue from what we believe to be one of its legitimate sources.

Second—To endeavor to compel the holder of land to use it to the extent that its qualities and situation demand.

Third—To prevent the aggregation of large landed estates in the hands of either individuals or corporations to the detriment of the masses of the people.

We lay down the principle that the landholders of our country are simply holding it in trust for the people of this and future generations, and that as it is the prime source of all wealth, it must be adequately used for the purposes for which nature and its situation has fitted it, or the nation suffers.

We believe that the government of any country has the right and also the duty to see that the land within its jurisdiction is put to the uses which will be best in the interests of the whole nation, and that any land held at variance with these principles should be subjected to any law which the government can devise which will bring it into its proper use.

The fetish which has surrounded the ownership of land ever since the inauguration of the holding of land in fee simple and which has been allowed to govern the people of most of the civilized countries of the world has been reduced in power more in Australia than in any other country.

The old feudal system was based upon the same principle as an up-to-date land system should be today. The feudal barons of old held their lands only on condition that they did their full duty by the state which was represented by the king of the country. The holders of land today must be brought to the same realization that they only hold their land so long as they do their duty as landholders to the state.

Their duties to the state were well defined in the old days. They had to provide the whole of the revenues to run the country in times of peace. They had to provide the money and men to carry out the defense of their country, and to do these things they had to use the land they held in such a way as to produce enough from it to enable them to carry out these obligations.

What are the true duties of the holders of land today? To use it or cause it to be used in such a manner that it produces the best results for the nation. If they fail in this duty, the nation has just the same right to step in and take their lands as had the king in the feudal days of old.

Owing to the increase of the world's population and to the fact that this population has an unalienable birthright in the land of the country in which they live, this land must be made to produce its full quota so that the people will be provided with the necessities and some of the luxuries of life. Anyone, therefore, who keeps land locked up out of production, or who puts the land he holds to uses inferior to its latent qualifications for production, taking its situation into consideration, is an enemy not only to his country but to the whole of the people therein.

We in Australia lay down as a principle, and it is accepted by our people as an economically correct one, that the ownership of land carries not only a great privilege but also carries a great obligation, and the latter is the most important part of the contract.

Any system, therefore, which will compel unwilling or careless landholders to do their full duty to the country and to their fellow citizens is worthy of support by all who wish their country well.

Land taxation has this effect and that is one of the reasons why we in Australia have accepted it.

The system of unimproved land value taxation was first brought into existence in Australia in 1895 by the government of the state of New South Wales. The law passed provided for the levying of a state land tax on the unimproved value of all lands held by any individual or corporation above the value of $1,250.

Anyone with landed property below the value of $1,250 paid no land taxation nor did any larger landholder upon $1,250 worth of his holding, but for every $5 worth of land he held beyond that exemption he paid 2 cents per annum in land taxation.

This was a small beginning and the provision for the exemption was perhaps economically incorrect, but it had a wonderful effect. Land was immediately put to higher uses so that the tax might be paid from profits and not from its capital value and the transition occurred so rapidly that the land so taxed did not decrease in value but actually increased in value in direct ratio to its higher uses. These increased values provided a greater taxable capital value and the result was not only increased production but by its greater use increased values to the land and consequently increased revenue for the state.

The experiment had been tried and had proved effective.

From this moment the system started to extend until today every shire throughout the land and every municipal area with the exception of a very few of the large cities, derive the whole of their revenue from unimproved land value taxation.

The shires' councils cannot collect taxes except from the unimproved value of the land; the municipal areas councils have the right to collect taxes both from the unimproved value *which is mandatory* and from the annual rental value which is *optional,* but in actual practice the greater number of them collect only on the unimproved values.

In every case the people have the power to fix the amount of taxation when any proposal is made to raise it above the minimum of 2 cents on the $5. They have also direct jurisdiction over taxes collectible from special areas and also over all proposals to raise loans.

All the local governing areas are divided into ridings and if any proposal is made to carry out a special work in any riding which will be of no benefit to the rest of the area, the people in the riding concerned have full power to decide whether they are to be taxed for this purpose or otherwise.

In fact we have home rule in taxation in Australia as far as all local government areas are concerned.

Under this system while it has acted to prevent hasty decisions in regard to proposed expenditures, it has invariably had the effect of securing the carrying out of all essential public works. Taxation in Australia is not to any serious extent duplicated.

The land tax collected within a municipal area automatically does away with the state land tax so soon as the amount collected as municipal taxation on the unimproved value of the land within such municipal area equals 2 cents for each $5 worth of land.

The county tax is not collected within the boundaries of incorporated towns unless the town and county are coterminous so the people are only subjected to two sets of land taxation when they come within the provisions of the federal land tax law.

This federal land tax was brought into existence to provide the money necessary for defense purposes, the principle of it being that *"the owners of Australia should pay for its defense."*

This law provides for a progressive land tax with an exemption of $25,000 worth of land to each individual landholder. Lands are taxed under this law as follows:

Under the unimproved value of $25,000	no tax
For each $5 over $25,000 up to $75,000	2 cents
For each $5 over $75,000 up to $150,000	4 cents
For each $5 over $150,000 up to $225,000	6 cents
For each $5 over $225,000 up to $300,000	8 cents
For each $5 over $300,000 up to $375,000	10 cents
For each $5 over $375,000	12½ cents

It will be seen that this defense land tax does not fall upon the small landholders at all, but upon the large landholders it presses very heavily, and it is meant to so press on them that they will disgorge some of the large and valuable areas which they have become possessed of.

On all landholders that hold land in excess of the unimproved value of $375,000, the tax amounts to a payment annually of 2½ per cent of the actual unimproved value of all land they hold beyond that value.

NIEL NIELSEN,
Trade Commissioner to America for
New South Wales, Australia.

VIEW OF HOME RULE LEAGUE.

After a study of the suggestions as presented in the Foreword, issued by this commission in August last, the Home Rule in Taxation League has submitted the following letter containing their recommendations:

State Tax Commission,
Sacramento, California.

GENTLEMEN:

The Home Rule in Taxation League has for many years been actively interested in promoting home rule and taxation for all of the cities and counties of the state, in promoting tax reform, including particularly land value taxation, the single tax as adopted by the irrigation districts of the state, the abolition of the tax on shipping, and the abolition of the poll tax. Its proposed constitutional amendment for home rule in taxation received in 1912, 169,321 votes, and in 1914 it received 267,618 votes from the electors of the state. Ten irrigation districts, including more than a million acres of the best agricultural lands of the state are now operating under the single tax for irrigation purposes, 359,176 electors, being more than a majority of the electors of the state, cast their votes in 1914 in favor of abolishing the tax on shipping. Also in the same year the people of the state cast 405,375 votes, being more than a majority, in favor of repealing the poll tax. This league, as an active advocate of such reforms, pursuant to the invitation of your commission in the Foreword, most respectfully present their views as follows:

We most enthusiastically appreciate the work of your commission in investigating the methods of revenue taxation, and the valuable recommendations made in connection therewith. As we understand the Foreword, it indicates that your commission is largely in harmony with the 267,618 electors above named, who in 1914 voted in favor of exempting houses, trees, vines, alfalfa, vehicles, horses, cattle, pigs, household furniture, merchandise, and other improvements and personal property from taxation, leaving the value of land and the value of public service franchises as the chief source of the public revenues of the state.

1. We most heartily indorse the proposition in said Foreword of exempting chattel, as well as real estate mortages, from taxation. Such taxation is a special hardship on a large number of borrowers by burdening and limiting their borrowing capacity, and produces but a nominal amount of revenue.

2. We also heartily commend the proposition of the Foreword to exempt automobiles from the local personal property tax. Nothing has done so much for the building of good roads, for the development of the great new enterprises of recent years, for the convenience, happiness and even necessities of thousands of our people, as the automobile. Any tax which burdens or restricts the ownership or use of the automobile, will tend to limit or destroy its use and to deprive our people of the full blessings of this great invention. For the reasons above stated we would also oppose any increase in the state license fees on automobiles.

3. We also commend the statement that the commission is not inclined to recommend an income tax to supplant the present tax system. We would not oppose an income tax as a substitute for all personal property taxes, provided such tax be limited to unearned incomes.

4. We most heartily commend your statement that "The private ownership of large holdings of land unimproved and uncultivated is recognized by the constitution of this state as being against public interest, forcing, as it does, the purchaser who wishes to improve his land to pay to the holder the speculative and socially increased value of such land." Our tax laws should be such, and our taxes so levied, as to break up this evil, and thus bring about the actual enforcement of this constitutional provision.

5. We also indorse your proposition that "The holding of large interests in improved land and the consequent accretion of value thereto because of its situation, and not because of the efforts of the owner, is also against the public interest." High selling or market price of land tends very largely to prevent its ownership by actual users. The result is to keep large or valuable tracts of land in the hands of speculators and out of use, producing many social evils.

6. We also most heartily approve and commend the idea that "fundamentally, every man has the right through his labors to a reasonable living from the land." Unless land is made easily accessible to labor, a fair and reasonable living becomes very difficult or impossible of realization. It is only from the land that a living can be secured.

We recognize the grave danger to the state caused by our land problem, but we can not see that a tax on the future increase in the value of land, whether the land is improved or unimproved, unless such tax is uniform on the present value as well, will in any way lessen that danger. Land can easily be put to a "beneficial use" by pasturing cattle or sheep on it. The number of acres per head required to make such beneficial, varies with the land. A goat might be pastured on a million-dollar lot in the center of a city. Nor do we think a tax on the future increase in value is practical or just. We can see no reason for attempting to discriminate between the future increased land values, and the values which have heretofore accrued. Such values are of the same nature and produce the same economic effect irrespective of the time of their creation. Any such discrimination would not only be difficult to establish, but would also create a complex and intricate system utterly inefficient, very costly to enforce, and would not appeal to the American sense of justice and fair play.

Nor do we understand how the exemption from any tax on the holdings of improved or beneficially used land would destroy large holdings. In New Zealand and Australia the graduated land tax has frequently resulted in the division of large holdings among members of the family, trustees and private corporations, in lieu of actual sales. Certainly no such tax, especially in confined-to-land values hereafter created, would cause the owner to give it away or sell it for less than the market value. Any tax which discriminates between individuals or classes, not only has an unjust basis, but because of such partiality, secures a lax enforcement not inherent in a uniform and fair land-value tax system.

We hold that a uniform land-value tax upon all land owned by private individuals or corporations, and upon all franchises of public service corporations, is a just and wise method of taxation, when such a tax is disfigured by class exemptions and other indefensible imperfections, tax reforms, or any just system.

In a recent election a proposed land-taxation amendment received 260,332 favorable votes. This was a wonderful showing, which indicates the rising tide of sentiment for land-tax reform. It practically forecasts an overwhelming vote in favor of a moderate measure embodying the single tax principle at the coming election two years hence. Inasmuch as your commission is about to issue a report embodying recommendations of tax reform and methods of raising revenue, we advise our friends to await the report and the action of the legislature thereon. If your commission recognizes the fact that land and franchise values are social values from which the state has a moral right to collect its taxes, and make your recommendations accordingly, and if such recommendations are heeded by the legislature, and the necessary legislation enacted, then we will give our hearty indorsement and support thereto. If this should not eventuate, then we will present a measure to the people, that, while not revolutionary, will meet the demands of those who voted in favor of Amendment No. 5, and also a large number of those who voted against it.

We strongly urge upon you your recommendation of a state constitutional amendment written along the same lines as the following:

Section 10¾. All personal property except the franchises of public service corporations, and all improvements in, on or over land shall be exempt from taxation for state purposes.

Please accept our sincere regards.

Very respectfully yours,

THE HOME RULE IN TAXATION LEAGUE.

J. W. Bucklin,
Edward P. E. Troy,
Walter Thomas Mills,
Committee.
Clarence L. Todd,
Secretary.

STATE INCOME TAX.

Preliminary to a consideration of the subject of a State income tax, it is important to review briefly the increasing complication occasioned by the tendency of the federal government to annex as sources of revenue for national purposes, in lieu of the indirect method of raising revenue through the tariff, both the income and inheritance taxes.

Congress, in carrying into operation the federal income tax amendment, placed a nominal tax upon all incomes in excess of $3000, in case of single persons, and $4000, in case of married persons, and an additional or surtax upon all incomes over $20,000.

In 1916, however, an effort was made to lower the exemption, but this finally was defeated. Instead, the rates were increased, that of the normal tax being raised from 1 to 2 per cent.

It is only a matter of time before the federal government will tax small incomes unless action is interposed by the states.

A distinct invasion of the field hitherto reserved for state taxes, was the action by Congress at its 1916 session, in imposing a tax on inheritances. True, the federal tax for the present is confined to estates in excess of $50,000, but here, also, the demand will steadily press for a lowering of the base of the taxable estates.

The inevitable result, if the present tendencies are continued, will be the complete absorption of both of these sources of taxes for federal purposes.

That this is so is generally recognized, and attested by the following editorial comment in the last (December, 1916) number of the Bulletin of the National Tax Association:

> "There is without doubt a strong tendency at present for the national government to assume increased functions, which inevitably require increased revenue. The search for revenue is very likely to lead the federal government from time to time to cast envious eyes upon taxes which the states have come to consider as their own."

In the opinion of this commission there is very strong reason why both the income tax and the inheritance tax should be used jointly by the state and the federal governments as sources of revenue—and this without any so-called double taxation.

What this commission proposes is this: that there be established a line of division, the federal government taxing all inheritances and incomes above, and the state all below such line.

The benefits of such a division are apparent.

Experience has shown that the states can not successfully apply a properly graduated inheritance tax to the very large estates, for the

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NOTE.—This discussion of the income tax is a reprint from the report of the State Tax Commission to the forty-second session of the legislature of the State of California.

reason that the very rich immediately will transfer their legal residence to some other state the moment their own state attempts to reach them by a properly graduated tax rate. The result is that states are timid about placing a proper rate upon large fortunes for fear of driving the very rich out of the state. It is obvious, therefore, that the state never will be able to deal successfully with the very large fortunes.

The federal government is the natural taxing agent of this class of fortunes. Wealth can not dodge the federal government tax by moving from one state to another, because the field is nation-wide. Hence, any properly graduated rate, however high, can be successfully applied by the federal government. Only in this fashion can the huge, swollen fortunes of this country be made to yield their proper share to the support of the government.

The state can and does adequately tax ordinary fortunes, for the reason that the amount of taxes taken out of an estate through the inheritance taxe does not warrant transferring legal residence in order to escape such taxes.

Obviously, the intelligent thing to do is for the state and federal governments to agree upon some line of division. Then, let the states have the exclusive use of all below such division line, giving to the federal government all above.

What is true for the inheritance tax, is true for the income tax. Persons with large incomes will transfer their legal residence just the moment the state seeks to apply adequate income tax rates on huge incomes. But if the state leaves the large incomes to the federal government, the federal government should in turn retire from the present field and confine its jurisdiction to incomes in excess, say, of $50,000 a year. The line of division for inheritance tax purposes should be fixed at, say, $5,000,000.

This commission recommends, therefore, that California's Legislature by resolution urge Congress to establish some fair line of division, giving to the states for inheritance and income tax purposes everything below such line and reserving to the federal government everything above such line.

Change in Public Sentiment.

During the last few years there has grown up all over the country a strong sentiment in favor of the income tax. Its popularity was demonstrated by the zeal with which the various states ratified the income tax amendment to the federal constitution. Several states already have adopted it for state purposes, and many others are contemplating taking over the income tax as a part of their local revenue system.

One of the most vigorous opponents of the state income tax was Professor R. H. Seligman of Columbia University, probably the foremost authority on taxation in the United States today. He has swung entirely around, and now is an ardent advocate of the income tax for state purposes. Last year, in his annual address before the National Tax Association, of which he was president, he said:

> "I have no hesitancy in asserting that the next step for states like New York is the substitution of income for property as the basis of taxation. The income tax has come to stay."

The change of this distinguished tax authority from the foremost opponent to the foremost advocate of the state income tax is but an index to the changed sentiment of the entire country.

Massachusetts Adopts Income Tax.

Following Wisconsin's notable successes with the administration of a state income tax, the people of Massachusetts last year ratified an amendment to the state constitution providing for an income tax, and the income tax goes into operation in that state in January, 1917.

Other states that have adopted the income tax in one form or another are Connecticut, West Virginia, Oklahoma, Mississippi, Nebraska, North Carolina and South Carolina.

New York State has it under consideration. The Committee on Taxation for New York, in its exhaustive report on taxation has just recommended the income tax for adoption. Here is what the report says:

> "Your committee have always been of the opinion that in principle the income tax is one of the fairest of all taxes. Such a tax carefully devised would go far toward solving the fiscal problem of New York City as well as that of New York State."

Interesting also is the report of the New York Joint Legislative Committee. It reads:

> "Of all the many reforms and new methods of taxation adopted in other states of the Union and in foreign countries, it (the income tax) seems to promise the closest approximation to the ideals of equity and equality. It does this by taxing each man in accordance with his ability to contribute to the support of the government which protects him, his property, and the social structure of which he is a part."

One cause of the rapid spread of the state income tax sentiment is the realization that if the income tax is to be adopted as a means of raising revenue for the state, action must be taken at once, before the federal government dries this up as a source of revenue.

Professor Plehn Urges Income Tax.

Professor Carl C. Plehn of the University of California, an authority on tax matters, was for years opposed to the income tax. Today he strongly favors it, and urges its adoption by California as "necessary to round out the tax system of this state."

In a communication to this commission, Professor Plehn says:

> "We are reaching today only the income from classes of property whose capital (property) value can be most easily ascertained. Some incomes representing large ability to pay taxes are not reached at all, others only partially.
>
> "It is clear that we need an income tax to supplement the existing taxes.
>
> "For obvious reasons the tax should be modelled closely upon the federal income tax. There are some minor differences that seem to be proper in adapting it to state use.
>
> "Of all standards for measuring equality in taxation that of the equal sacrifice of personal income is the one that meets with the widest approval in all countries and among all peoples."

Would Catch Tax Dodgers.

One thought in the minds of advocates of a state income tax has been the necessity of devising some method of bringing into the taxpaying fold those persons who now contribute nothing toward the support of the state government and yet enjoy the benefits and privileges which that government affords.

In California the property of many persons of wealth is situated in Eastern states and such persons owe some obligations to the state in which their persons are protected and in which their children are educated. Their children are given free textbooks and yet they contribute little or nothing to the government which has provided free textbooks at a cost to date of $570,660. Under the property tax they pay little or nothing. Only an income tax will reach them.

It is but elemental justice that such persons be compelled to carry a part of the tax burden. They owe just as great a fiscal allegiance to the government as does the small householder who regularly pays the taxes levied against his home.

Every dollar contributed by those who now are escaping their share of taxes will be a dollar taken off from the tax load borne by the present taxpayers.

Ability to Pay.

Tax authorities generally agree that the income tax is probably the most just form of taxation that can be devised. The modern theory of taxation is that persons should contribute to the support of government in proportion to their ability to pay, and there is no better index of "ability to pay" than a person's income.

The laborer who has no income above the minimum of existence pays no income tax. The little business concern which makes no profits and is just able to keep its head above water pays no income tax. Only the prosperous individual and the prosperous business concern pay the income tax. The greater the prosperity the greater the tax.

An analysis of the Wisconsin income tax returns demonstrates the fact that it does equalize the burden of taxation.

In the city of Milwaukee, 88 persons, whose taxable incomes were less than $1,000 each, paid only $487 aggregate tax, whereas 139 whose taxable incomes were over $10,000 each, paid $168,000, or 95 per cent of the total.

In the city of Sheboygan, five men of the 1,272 persons subject to the income tax paid nearly a fourth of the total tax.

An analysis of the classes of occupation shows equally interesting results, as follows:

> Twenty-five lawyers paid under the old personal property tax in 1911 a total of $4,237; under the income tax that same group paid $12,360.
>
> Twenty-one other professional men paid a personal property tax of $811; under the income tax they paid $9,137.
>
> Forty brokers paid a personal property tax of $1,803. They paid an income tax of $13,974.
>
> Seventeen capitalists paid a personal property tax of $1,448. When the income tax was adopted they paid $13,233.
>
> Less than one-half of 1 per cent of laborers are subject to the income tax.

The heaviest contributors are the money lenders, retired business men and capitalists generally. Such classes usually escape or shift the burden to the borrower under the property tax, but this can not be done under the income tax.

Distributes Tax Burden Fairly.

The income tax lightens the load of the weak and distributes it fairly and equitably upon the shoulders of the strong. It takes nothing from the individual's income until that income runs above the amount required by the American standard of living. It takes nothing from the new, struggling business enterprise. It takes nothing from big business engaged in experimental activities.

Substitutes for Personal Property Tax.

If the income tax should be adopted it ought not to be made an additional tax, but rather a partial substitute for the personal property tax. One of the most aggravating, because it is one of the most unfair, forms of raising revenue is the tax upon household goods, workmen's tools and farm machinery. This commission would recommend, therefore, that if the income tax is adopted, the present tax upon household goods, workmen's tools and farm machinery be abolished.

Application of Proceeds.

Again, the income tax should not be regarded as a *state* tax in the sense that its proceeds should be applied to state purposes. Being primarily a substitute for the local personal property tax, the proceeds should be returned to the local taxing unit where it was collected, deductions being made only to cover the cost of administration.

In Massachusetts the entire amount of the income tax is returned to the local unit, except that "the commonwealth shall retain a sum sufficient to reimburse it for the expenses incurred." In Wisconsin the state government retains 10 per cent of the revenues collected and pays all expenses. Twenty per cent goes to the county government and 70 per cent to the town, city or village in which the tax is collected.

Inasmuch as the income tax is proposed not as an additional source of revenue but as a means of reducing and of better distributing the burden of tax by producing revenue from untaxed sources, the receipts from this tax should be returned to the cities and counties under restrictions that will guarantee to the taxpayers the proposed relief.

If the income tax is adopted, the law should require compliance on the part of the city and county officials with certain limitation restraints on the total amount of tax to be levied. Such officials should be compelled to submit their adopted budget for the year showing a compliance with such limitation, before the income tax is apportioned to such city or county. From the ad valorem tax estimated to be levied under such budget there should be deducted the amount of income tax apportioned. This will insure the taxpayers in the different communities actual and very material reduction in their property tax bills.

History of Income Tax.

For nearly a century the income tax principle has been utilized in European countries, and in one form or another constitutes an important element in the fiscal system of every advanced country in Europe. Its highest development is in England and Germany, where the annual yield, prior to the war, aggregated over $200,000,000 in each country.

In this country the income tax was experimented with even during colonial days, but not in the modern form. Until 1913 the experiment was attended with but meager success. About twenty states have tried it in one form or another.

The federal government levied an income tax during the Civil War. It was repealed ten years later.

In 1894, congress enacted a general income tax act, which was declared unconstitutional by the Supreme Court. There then developed a nation-wide demand for an amendment to the federal constitution, and the sixteenth amendment was ratified only a few years ago.

In 1913 congress enacted a federal income tax, and the income tax is now permanently established.

Of all the states, Virginia has had the most extensive experience with the income tax. That state has taxed incomes for nearly three-quarters of a century, but with only limited success. The fault has been with her method of administration.

In brief, the history of the income tax, prior to 1913—so far as the various states in this country are concerned—has been a succession of failures.

The failure was due to the fact that the states committed the administration of the tax to local taxing offices, and the result was a lax enforcement and a very inadequate yield.

Central Control the Remedy.

Wisconsin made the first real move for a workable income tax. That was in 1908, when an amendment was adopted authorizing the taxation of incomes at graduated and progressive rates. In 1911 the legislature enacted an income tax law.

Tax authorities everywhere realized that the failure of all state income taxes in the past was directly traceable to lax methods of administration, and this danger was averted in Wisconsin by securing a high degree of centralization. Indeed, the distinguishing feature of the income tax law of that state is the importance given to the plan for centralized control. The administration of the law was placed wholly in the hands of a permanent state tax board.

The Massachusetts income tax law, recently enacted, likewise emphasizes the importance of central control, and the administration of the law of that state is placed in the hands of the central state authority.

Commenting upon this feature of the Massachusetts income tax law, Charles J. Bullock, professor of economics at Harvard and a recognized expert on taxation, says:

> "This is one of the wisest provisions of the law because it is vitally important that the act shall be uniformly administered without fear or favor by intelligent administrators in every part of the commonwealth."

Cost of Administration.

The cost of administering the state income tax is surprisingly low. In Wisconsin, the average cost of administration is about 1.6 per cent of the amount assessed—making it one of the most cheaply administered taxes known.

Exemptions.

The problem of determining what income shall be subject to the income tax is one calling for the most careful consideration.

In European countries, of course, the exempted incomes are exceedingly low, while the tendency in this country is to fix the limit at a point which will not impair the American standard of living.

Under the Wisconsin law, an exemption is allowed of $800 for single persons and $1,200 for married persons; then there is an additional exemption of $200 for each child under 18 years of age or other dependent person. In view of the fact that all of the expenses incurred in producing the income are deducted before the tax rate is applied, it will be seen that the exemptions allowed easily reach the subsistence line.

As a matter of fact, only 2 per cent of the total population in Wisconsin is affected by the income tax.

The rates in Wisconsin are progressive and rise from 1 per cent on the first $1,000 of taxable income to 6 per cent on taxable incomes in excess of $12,000 for individuals and partnerships. In the case of corporations, the rate is 2 per cent on the first $1,000 of taxable income to 6 per cent on income over $6,000.

Oklahoma's income tax law follows closely the federal income tax law. Every person amenable thereto is required to make an annual return to the state authority.

Deductions include necessary expenses in the conduct of any business, interest paid within a year on indebtedness, taxes paid except those of a local nature, losses sustained during the year unless compensated by insurance or otherwise, debts due the taxpayer that are charged off during the year, and wear and tear not exceeding 5 per cent.

Exemptions are fixed at $300 for single persons, and rates are graduated from .001 on the first $10,000 to .005 on all amounts in excess of $50,000. Married persons have an exemption of $1,000, and $300 for each child under eighteen.

Connecticut has an income tax on corporations, based upon the report to the federal government. The rate is 2 per cent upon the net taxable amount reported to the federal government.

Business corporations in Connecticut duplicate for state purposes the returns made by them to the federal government.

The New York Tax Committee, while proposing no specific amount for exemption, says:

> "The exemption from income tax should be reduced below the level of that existing in the present federal tax. The exemption, however, ought not to be so low as to trench on the income of the wage earner who is compelled to spend virtually his entire income."

Basis for Model Tax.

An ideal income tax for state purposes should make provisions for:

First: *Substitute for Personal Property Tax.* As already pointed out, the revenue should be for local, not state, purposes. It should not be an additional tax, but a substitute or partial substitute for the most offensive of all taxes—the personal property tax—thereby equalizing and reducing the local tax burden. Household goods, workmen's tools and farm machinery at least should be exempted from the present personal property tax.

Second: *Exemptions.* The income tax ought not to apply to incomes which would trench upon the American standard of living. Exemptions should be allowed for each minor child or dependent person.

Third: *Rate.* The rate of taxation should be graduated progressively up to a certain amount, beyond which a flat rate should apply.

Fourth: *Central Administration.* To what already has been said on the subject, it might be well to quote from the report of the New York Committee on Taxation; its fifth recommendation reads:

> ''The administration should as far as possible be in the hands of central authorities so as to ensure both expertness and impartiality.''

Fifth: *Open for Federal Inspection.* Provision should be made allowing inspection of state income tax returns by the authorized federal tax officials.

Sixth: *Question of Residence.* All incomes from property located in or business transacted in California, regardless of whether the recipient is a resident or nonresident of this state, should be subject to the income tax.

Also, all income accruing to legal residents of California for personal service whether as salaries, commissions or other earnings and upon all dividends from corporate stocks and interest on securities owned by them, whether in or without the state, should be subject to the income tax. Incomes from fixed property outside of the state—such as rents and profits from definitely localized business—should not be subject to the tax in cases where such income is subjected to an income tax in the states where the property has its situs. The income tax can not apply to those public service corporations which at the present time pay taxes directly into the state treasury nor should it apply to general corporations now bearing a franchise and license tax. The usual exemption should extend to religious, charitable and educational institutions. Where income is derived partly within and partly without the state a fair system of allocating such income ought to be provided.

Seventh: *What Represents ''Income.''* For purposes of the income tax law, the basis of the taxes should be the ''net income'' not ''gross income''; this is obtained by deducting from the gross income the necessary business expenses of the year and would include interest, insurance, taxes, depreciations, repairs, cost of material, wages, etc.

Eighth: *Secrecy Should Be Required.* The act should provide severest penalties for the violation of the secrecy of returns. No information whatever contained in any income tax return should be disclosed to any unauthorized person, other than the name and address of the person filing it. Severe penalties should also be provided for false reports.

Ninth: *Interstate Incomes.* Because of interstate difficulties provisions should be made for reciprocity on interstate incomes.

How the Income Tax Would Work.

To illustrate the operation of the income tax in what probably would be a typical case, let it be assumed that the taxpayer is married and has two children.

Assume that the law exempted incomes for a married person up to $2,000. Then such person would be entitled to a reduction for each of the two children, to which would be added other possible deductions, bringing the total exemption up to, say, $3,000.

If the taxpayer received an income of not to exceed $3,000 a year he would pay no income tax.

If, however, he had a total income of, say, $4,000 a year, he would pay at the established rate of, say, 1 per cent upon the taxable amount of $1,000—or a tax of $10 a year.

If his income amounted to $5,000 a year, he would pay one per cent on his first $1,000 and, say, 1½ per cent on his second $1,000 of taxable income—or a total tax of $25.

It would seem that a tax of $25 for a person with an annual income of $5,000 would not be excessive, particularly when the personal property tax on his household goods is abolished and, furthermore, inasmuch as the payment of the income tax will automatically reduce the tax rate that would be levied upon other taxable property that he might have.

Of course, as the income increases the rate would undergo a corresponding increase, so that the tax which a man with an income of $50,000 would have to pay would be considerable. However, it is but just that a man with a $50,000 annual income should pay more in proportion than a man with $5,000. And in the same fashion, a man with an annual income of $500,000 should pay more in proportion than the man with $50,000.

There are persons in California with large annual incomes who pay little or nothing to the support of the local government and yet who enjoy the protection and privileges which the government affords. In many instances their income is derived from property located in other states, so that under the present tax system they have nothing against which taxes can be levied. An income tax would require them to assume their proper share of the tax burden, which would automatically lighten the burden now borne by the present body of small taxpayers.

PERMANENT BUDGET SYSTEM.

In dealing with the revenue problem of the state, consideration must be given, first, to the amount of money actually needed to carry on governmental activities, and, second, to ways and means of raising the money.

The trouble with state financial systems in general is that consideration is given, first, to the amount of money that can be raised, and second, to the question of how to spend it. If money is plentiful, there invariably are ''needs'' for every cent of it. In other words, the amount of money that a state can afford to spend for various activities is too frequently regulated by the amount of money available.

In a well regulated commonwealth, therefore, the first concern should be to determine by budget procedure just how much money actually is required properly to conduct government in its various branches. That being determined, the problem of ascertaining a scientific method of producing the needed revenue is vastly simplified.

Definite change in state financial policy.

Prior to Governor Johnson's administration the state's financial matters were in utter chaos. During the two decades preceding 1910, $200,000,000 of the taxpayers' money had been expended for state purposes without an audit. Appropriations were made by each legislature on a log-rolling basis, with no definite knowledge of the comparative needs of institutions. No attempt had been made to consider scientifically the state's fiscal policy as a whole. Regular appropriations, special appropriations and deficiency bills were thrown into the legislative hopper in haphazard fashion, with little or no thought of where the money was to come from. Appropriation bills, carrying millions of dollars of the taxpayers' money, were blindly introduced and blindly passed by the legislature.

One of the first reforms instituted by Governor Johnson was the establishment of the State Board of Control, to introduce some sort of business system in the conduct of the state's various activities. More has been accomplished in the interest of efficient and economic administration by this single act than has been achieved by any other state in the past twenty years. It was the commencement of a sound fiscal policy for California, which is forming the model for other progressive commonwealths.

The big accomplishment of the Board of Control, working in conjunction with the State Controller, has been the creation of a State Budget System—giving to California the distinction of being the first state to install a fiscal plan which will insure the most judicial use of the taxpayers' money for purposes most desired by the citizens of the state. The great, outstanding result of this budget system is that the state has been able, during the past six years, to meet the greatest growth in its history with the smallest percentage of increase in appropriations.

Present budget voluntary growth.

Curiously enough, California's budget system is not founded upon any constitutional provision, nor yet upon any definite legislative enactment. It was initiated by the Board of Control with almost an arbitrary exercise of its power, yet so effectively has it been operated, that today the budget is accepted with as great respect as though it were constitutionally mandatory. It is sustained, not by the constitution nor by direct statute, but by public opinion.

Some idea of how it is working may be gleaned from the results of the last legislative session. There were introduced at the 1915 session finance bills, counting duplications and school-support bills, amounting to more that $63,000,000. The budget made allowance for approximately $36,000,000. So closely was the budget followed by the legislature that the total of general and special bills finally passed was nearly a half million dollars LESS than the budget recommendations.

But what of the future? Much of the credit for the success of the budget system in California has been due to a strong administration. The people may not always be fortunate in having strong men at the head of the state's government. The wise thing to do now is to provide against a possible weak administration. In other words, perfect present machinery so as to make it impossible for even a weak or inefficient government to revert to the chaotic, logrolling methods formerly in vogue.

Budget should be made permanent.

One of the first steps should be to insure the permanency of the budget system by having it incorporated in the constitution. That will prevent in the future a weak or a corrupt administration abolishing the budget and reestablishing the old system that made graft possible and waste inevitable.

A second advance would be legislation providing that the chairman or other member of the budget board shall be required to appear before each house of the legislature in committee of the whole as well as before the legislative committees, to submit, explain and defend the budget.

At the present time the task of defending the budget and of explaining its numerous technical features is imposed upon the chairmen of the legislative committees, who can not hope to have the knowledge and information possessed by the person whose sole duty it is to familiarize himself with the intricate fiscal problems of the government. The inevitable result is that members of the legislature, insistent upon a thorough and systematic scrutiny of the budget proposals submitted to them, ply the legislative chairmen with questions that not infrequently they are unable to answer, but which would be promptly and simply explained by the representative of the budget board.

A third step would be a limitation, to prevent indiscriminate raising of a budget item or the budget total by requiring a two-thirds vote of the legislature to make any increase. In practice even now the legislature confines itself to the ratification, reduction or elimination of budgetary items; no increases are seriously proposed. To prevent future possible abuses, however, this limitation of powers should be made mandatory.

Publicity necessary in budget control.

A fourth consideration is the matter of publicity. The participation of the public in budget-making is of the utmost importance, and should be encouraged wherever possible. This can best be done through public hearings and the active cooperation of civic organizations. The better the public comes to understand the budget proceedings the less danger there will be of a squandering or waste of the resources of the state.

Finally we have for consideration the question of administration of the budget. Obviously, it should be in the hands of a technically trained board. Upon that board the governor should have a majority directly accountable to him and in sympathy with his governmental program. In this way it is easy to fix responsibility, and in a well regulated government responsibility should be centered in the executive. But as a protection both to the public and to the executive there should be a minority on the board independent of the executive. The board as a whole should comprise the departmental representatives who have to do with the fiscal affairs of the state.

SUMMARY OF RECOMMENDATIONS.

After a careful investigation and analysis of the matter of revenue and taxation, the remedies that this commission would suggest as applicable to conditions in California can be grouped under two main headings:

> *First*—Changes in the statutory law which permanently and substantially will strengthen tax administration, either under present constitutional provisions or under amendments which may in the future be made to the constitution.
>
> *Second*—Changes in the constitution necessary to eliminate present defective provisions, and to allow the development of a permanent and sound taxation policy.

While this investigation has extended over only the short period of a year and four months, an intensive study, which is summarized in our discussion and tabulated data, points out definite methods which may be adopted to put our state far in advance of other commonwealths in the matter of revenue and taxation.

Need of budget control for public expenditures.

It is imperative that effective methods of budget control be adopted, not only for the state but for the counties and for the cities, if economy and proper expenditure of public money is to be accomplished.

Such budget control should be established in as permanent a fashion as is possible, with as independent action on the part of the budget board as our form of government will permit, but with as strict responsibility and safeguards as may be established for the security of the tax-paying public.

California was the first of the states to put into effect a practical budget system. Some of our counties and municipalities have been working along the same lines. The state and the various political subdivisions should not rest in this matter, until there has been established efficient and practical budget laws and budget systems.

The prevention of waste in public expenditures is a prerequisite to any effective fiscal program.

This commission recommends immediate legislation, establishing a permanent budget system.

Scientific basis for making assessments.

The foundation underlying the taxation of property is the valuation and assessment thereof. In the fore part of this report we go into a detailed discussion of the needs along this line and the remedies to be applied for evils existing under our present system.

It is primarily necessary that a proper record of data be established upon which to make assessments. As has been pointed out, no serious attempt has been made along this line in all the years of the existence of the state government. In fact, in no state in the Union has appreciable advance been made along this line. It is essential to any successful tax system that there be accomplished the constructive work of a classification survey of agricultural lands which will comprehend and record all immovable, tangible property pertinent to the land, and the installation of some standard of the unit rule for assessment in cities. This commission recommends legislation along this line.

An effective tax limitation law should be placed upon the statute books, to aid not only in effecting economies in cities and counties, but to lay the foundation essential to full value assessment which is practically impossible under existing conditions. A full discussion of this subject is made elsewhere in this report.

With this foundation laid by classification and unit rule and an effective limitation law, full value assessment of taxable property could and should be accomplished. Statements from all tax authorities, and reports of investigations in all of the states, point out that there can be no substantial equalization of assessment as between different property owners until full value assessment is effected.

As a matter of economy and efficiency there should be eliminated all duplication of assessment and collection of taxes, such as exist now in our cities and counties. This can be accomplished without interference in the local affairs of municipalities if the full value assessment is established.

It has clearly been shown by the experience in this, as well as in other states, that certain classes of property, such as the property of public utilities and intangible properties, can be assessed properly only through a central tax authority. Certain of the property of public utilities and certain forms of intangible property are now assessed by the state, but there are other of these classes of property which still are assessed locally. All of these forms of property should be assessed by a central tax authority, which authority should cooperate with the local assessing authorities in bringing about an equalization of assessment between the property centrally assessed and property locally assessed.

One source of information essential to the proper assessment of real estate is comprehensive data on actual sales of such property. It is impossible under present conditions to obtain this data with sufficient accuracy to make it of definite value. A law should be enacted requiring that whenever a transfer of realty is made, the actual consideration or, in the case of a gift or other consideration than money, the actual value of the property transferred be made a matter of record. A penalty for noncompliance or erroneous statement of the true consideration should be provided.

There should be required by law a thorough and systematic notification of the existence of taxes and assessments, so that the individual taxpayer may have an adequate knowledge of any lien against his property.

The present cumbersome method of carrying on the tax rolls and tax receipts a detailed description of realty has been abandoned in other of the states and has been substituted by reference through a number to the parcel assessed. This commission recommends that this method be adopted in California.

This commission also recommends that provision be made by law for the separation of the real estate and personal property rolls, and an assessment of real estate only once in every two or four years.

In the matter of assessments of property there are certain classes, such as mines and oils, which require separate and distinct treatment. The same data which is necessary and sufficient for the valuation of agricultural and city real estate is not sufficient properly and equitably to assess these distinct classes of property. Much can and should be accomplished through standardized forms, so that the same data will be presented to the assessing authority from all of the mine and oil properties affected.

Proper adjustment of the burden of taxation.

There has been discussed at length the necessity under our present form of taxation of the adjustment of the burden of taxation between general property and the properties set aside for exclusive taxation by the state. There has been pointed out the absurd necessity which requires the determination of the ad valorem rate which the public utility property bears, but which is applied not upon the property itself but through an estimated percentage against the gross receipts of such companies. This costly and unsatisfactory procedure should be eliminated.

The result of this investigation shows that for the year 1916 the average burden of tax upon the utilities was $1.2566 on the $100 of value. The burden upon general property for 1916 was $1.209 on the $100 of value. If we take into consideration the fact that the public service corporations are not paying the license tax which is being paid by other corporations, the ratio of comparison for general property would be $1.2219 on the $100 of value.

The relative burden borne by the different classes of corporations varies considerably from the average burden. As will be seen under our discussion of the stock and bond valuation of public utilities, the ratio varies from 1.0838 in the case of gas and electric companies, to 2.266 on express companies. There is no substantial variance with the average in the case of the railroads, telephone and telegraph companies and car companies.

It would seem from the investigation made by this commission that equity as between the corporations would warrant a reduction in the rates applied to express companies and an increase in the rates applied to gas and electric companies. The rates on banks and insurance companies appear equitable in comparison with the public service utility rates.

Double taxation of banks and utilities.

The banks have claimed, as set forth in a statement by the chairman of the taxation committee of the California Bankers Association, that under the present system they are subjected to double taxation because only the assessed value of real estate is deducted from the full value of the bank.

The conclusions of this commission are that while the banks ordinarily might have just cause to complain, the total taxes which they now pay are not in excess of what should equitably be assessed against them, because of the fact that all of their property lies within incorporated cities, where the total rate is much higher than the average rate for the state as a whole.

There has also been presented the matter of double taxation in the case of the light, heat and power companies. The commission feels that there is an element of double taxation existing in the case of these companies which might properly be rectified by legislative action, permitting the assessing board to make proper allowances where double taxation exists.

County loss sustained under Amendment No. 1.

Another adjustment which it is necessary to make is that in the case of counties suffering because of the withdrawal of railroad property.

If the present system of separation is continued, in all fairness it will be necessary to make adjustment with counties suffering net losses because of the withdrawal of all operative property of public utilities.

Under the present provision of the constitution, adjustment can be made between the state and the several counties only for losses suffered on account of the withdrawal of railroad property.

This commission has made a detailed study of this particular phase of the matter and recommends a change in the present method of determining the loss.

Under the method adopted by this commission it was found that San Bernardino County, which is the heaviest sufferer, lost $134,016.93 more than she had been reimbursed during the five years from 1911 to 1915.

Figures on the other counties will be presented later, during the session, if it shall appear that any of them have suffered additional loss.

Equity would demand that where a county has suffered on account of the withdrawal of operative property other than operative railroad property, adjustment of the loss should be made. There is no good reason why reimbursement should be made for loss sustained by the withdrawal of operative railroad property than for loss sustained because of the withdrawal of other operative property.

If a county has suffered loss in the past or should suffer loss in the future because of the development of public utilities, that loss should be in some way adjusted either between the state and the county or between the different counties themselves. There certainly is no justice in allowing one county to gain and another county to lose because of the present system of separation under Amendment No. 1.

Economics possible by business methods.

The adoption of the budget system for city, county and state, it has been pointed out, will result in much needed economy in the conduct of those governments.

Also, much saving can be made because of the elimination of duplicate assessments and collection of taxes.

In addition to this, there should be fuller cooperation between the functions of the state government and those of the counties and cities. This cooperation should take the form of providing for the central purchase of school supplies, including only those supplies that can be standardized and purchased in bulk for delivery to the several counties. It is estimated that an approximate saving of $600,000 a year can be made on this item alone.

Another place where cooperation between state and local governments can make big savings is in the purchase of road supplies. This could be accomplished by utilizing the state highway organization, which purchases supplies for delivery in the different cities and counties of the state. In addition to the supplies purchased for the state, those for the cities and counties could be purchased at the same time, making a saving both to the local governments and to the state by increasing the total amount of purchase.

Approximately $4,600,000 was levied for general road expenditure in the state during the present fiscal year. In addition to this, there are several millions of dollars expended annually in permanent road and street work, through bond issues and direct special taxes. Upon the basis of savings made by the state through centralized purchase of supplies, it is safe to estimate that at least $2,000,000 annually could be saved in the total road and street expenditures if the supplies were purchased through the central agency.

Tax on increased value of land.

The necessity and advisability of placing a tax on future increase of land values is discussed at length elsewhere in this report. There seems to be no other effective way of remedying or controlling the abuses which grow up through large land holdings.

In the application of this tax it is advocated that a heavier burden be placed upon unimproved and undeveloped lands than is placed upon those that are beneficially used. Such a tax would at least bring about closer equity in the taxation of small and large land holdings. This commission advocates the passage of such a measure at this time, even though there is question as to its effectiveness because of constitutional limitations. To remove any doubt as to the constitutionality of such an act, the adoption of a constitutional amendment authorizing such legislation is recommended.

State income tax would strengthen revenue system.

There is set forth in another part of this report a comprehensive discussion of the importance of an income tax to assist in perfecting our present tax system. An income tax can be passed under the present provisions of section eleven of Article XIII of the constitution.

Under such a law exemptions should be allowed amply to cover the American standard of living. The tax should be levied in part as a substitute for the tax on personal property in the form of household furniture, workmen's tools and farm machinery, and as a means of reducing the burden on other forms of property locally taxed.

California should inaugurate this form of taxation before the source has been dried up because of the application of the federal income tax.

To avoid what would be a form of double taxation and to eliminate serious conflicting jurisdiction in the income and inheritance tax fields, this commission recommends that every effort be made to secure an agreement whereby the states and federal government adopt some definite line of division, everything below such line to be reserved to the states for purposes of taxation and everything above to be reserved to the federal government.

Regulation and taxation of the jitney bus.

We present in the fore part of this report a discussion of the situation which has developed because of the entry of the jitney bus as a means of transportation. A solution of this problem would seem to be proper state regulation and equitable and uniform taxation of the industry by the state, with a proper distribution of the receipts from the tax back to the cities and counties.

Changes suggested in taxing automobiles.

The difficulties arising in the local taxation and assessment of automobiles can be overcome by having the tax applied centrally and collected by the Motor Vehicle Department, if legislation satisfactory to the different communities can be devised. Considerable economy can be accomplished through this method of applying the tax. In addition to this, an equitable system of taxation will be provided, so far as the owners of machines are concerned.

Result of application of franchise and license taxes.

There are appended to this report some interesting tables showing the result of the application of the franchise tax in California. Abuses are apparent, but these can be corrected by more effective administration of the law as it now stands, without additional legislation.

The study which this commission has made of the license tax leads it to the conclusion that such tax is not an unfair or unjust burden, except that it may be applied only to a certain class of corporations. This can be remedied, however, by the proper adjustment of rates on the corporations not paying such tax. The continuance of the license tax under the present law is recommended.

Fundamental changes in the tax system.

In approaching a possible solution remedying the evils which have been pointed out as existing under the present rigid provisions in the constitution, it is hardly necessary to say that to leave the present system stand as it is, would be an utterly irresponsible way of handling the matter. Such a procedure would lead to continued and greater inequality and injustice.

Three general methods of attacking the problem present themselves:

> *First*—Change the system back to the basis of assessment and taxation of property at its situs, all taxable property to be levied against for state and local purposes; but retaining the central

> assessment of public utilities, franchise and other liquid forms of property, and a central control of all assessments so that equalization may be properly established. Leave to the state the separate sources of revenue, such as inheritance, license and franchise taxes, and give to the counties and cities an income tax in place of tax on intangible and other personal property, such as household goods, workmen's tools and farm machinery.
>
> *Second*—Adopt a true separation of state and local revenue, leaving the tangible property for taxation in the locality where it is situated, necessitating a central assessment of the physical property of public utilities and the central control of all assessment for proper equalization. Leave to the state the income tax, franchise tax, tax on other intangible forms of property, such as the taxable value of banks and insurance companies other than their real estate; the inheritance tax; the license tax and other minor forms of taxes and fees.
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> *Third*—Eliminate the present restrictions in the constitution and give the legislature freedom of action in dealing with the revenue system. None of the other states have such rigid restrictions in the constitution as California, and many of them, such as New York, Connecticut, New Mexico and Arizona, have practically no restraint on the legislature.

The first and second proposals have meritorious features. The first would solve most of the actual and potential troubles of the present system through proper administration.

The second proposal is held by many to be the ideal toward which the state should gradually work. Under this, as well as under the first proposal, the individual would have a direct money interest in both the state and local governments. With true separation much of the difficulty would disappear as to a proper apportionment and equalization of property tax between state and county. Complete separation, however, could not be hoped for at this time, because the independent sources of revenue for state purposes are not well established. Complications which are vital enter here as between federal and state revenues.

If the first proposal were adopted it should be inaugurated in a way that would permit of a gradual accomplishment of true separation.

The third proposal was attempted by the constitutional amendment, defeated at the special election on October 26, 1915. The people indicated an unwillingness to leave the matter of taxation wholly in the hands of the legislature. The one outstanding reason for this seems to be the fact that under our constitution the legislative branch of the government has not the necessary permanency because of its frequent changing membership.

Notwithstanding this condition, experience in other states has shown that the legislature is best able to handle the problem; that more equality would result by giving the legislature more power and direct responsibility. It is a fundamental truth in all business that the agent who acts with direct responsibility gets the best results.

The present objections might be met by a constitutional amendment giving to the legislature the power to modify by statutory provisions any of the provisions of Article XIII of the constitution, providing, however, that any statutory law thus passed and signed by the governor should automatically be submitted to a vote of the people at the next general election following the session at which it was passed. The law, if approved by the people, would take effect for the succeeding fiscal period. This would insure to the people final authority in taxation matters.

Through this method, carefully drawn taxation provisions could be worked out for the state with a broad policy constantly in view, without cumbering the constitution with useless detail. Under such a system the people would have a more effective control of tax matters than at present, at the same time allowing the elasticity necessary to a sound revenue policy for the state.

THE NEW ENGLISH LAND TAXES.

By Carl C. Plehn.

Introduction.

The new English land taxes (duties) are interesting from many different points of view. Historically, they recall to mind the old land tax of 1692, and especially the bargain, good or bad, which was made with the landowners by Parliament in 1798, by which the tax might be redeemed, and under which a large part has been redeemed. The new taxes are, to be sure, very different in theory, as also in force and effect, from the old land tax. But one of them, at least, that is the "Undeveloped Land Duty," can, without stretching the point, be regarded as a repudiation of the ancient contract of immunity. In the political field their enactment caused a well-nigh revolutionary struggle over the rights and powers of the House of Lords, and in so far as these taxes may eventually diminish the value of private ownership or rights in land, and hence the dignities attaching thereto, they may eventually alter the constituent character of that house. But this, of course, is problematical.

Economically, they distinctly recognize the argument that land values, excluding capital invested in the land, and especially that the increments in land values, are the result of social progress, and hence, if that is not a *non-sequiter,* are appropriable by government to promote that progress. As yet they go but a little way toward the appropriation of the entire increment, but, of course, they may be increased. In a more emphatic way they assert that there is a public duty attaching to the ownership of land, the duty to develop and use it, and hence to enhance the wealth of the nation. One of them looks distinctly like a penalty for nonuse of land. It may, however, be regarded as a tax on unrealized income.

Sociologically, they are held to contain the possibility of changes in the constituent classes in England. This, again, is problematical.

Financially they involve several interesting and novel experiments. Their administration requires the establishment of very costly machinery. Especially has this machinery been costly in the installation. Although the revenues are very small, as yet, and may continue so, especially in view of war conditions, particularly when compared with the "great engine of finance," the income tax, yet this subsidiary engine has the promise of developing considerable power. The Napoleonic wars and their resulting fiscal burdens fastened on England the income tax, which had been introduced as a temporary expedient. It is possible that the world war will rivet the new land taxes to the British tax system, although it is possible that the costliness of their administration will militate against that. At all events, since the new machinery was so nearly perfected before the war, it may be exploited to meet the increased burdens. The possession of power leads to its use.

Obviously it will be years before we shall be able to judge of the political, social and economic effects of these new taxes. In the immediate future many of the financial results will be obscured by the disturbances in expenditures and by the extraordinary calls on the revenues due to the war.* But there are some features of the new taxes that can be profitably studied without waiting for further developments. One of these is the method of valuation laid down. This is full of instruction on the whole problem of values and of valuations.

The list of new taxes.

"The Finance (1909–10) Act, 1910" (this jumble of words and numbers being the legal title of the act provided for it by Parliament), established four new taxes on land. They were by name and briefly characterized:

1. The Increment Value Duty.
2. The Reversion Value Duty.
3. The Undeveloped Land Duty.
4. The Mineral Rights Duty.

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*In support of this we may quote from the *London Economist,* which said of Mr. McKenna's Budget Speech of September 21, 1915: "It was a plain, unvarnished statement of unparalleled revenues, an inconceivable expenditure, and an unimaginable deficit, followed by a list of fresh taxation which imposed, as he said, an unprecedented burden on the country."

The Increment Value Duty is a tax on the increase in the value of land after April 30, 1909. The Reversion Value Duty is a tax on the value of the "wind-fall" the owner receives when leased property upon which a tenant has made improvements, or which has otherwise enhanced in value during the term for which it was leased, reverts to the owner by termination of the lease. The Undeveloped Land Duty is an annual tax on the capital value of the kind of land described by the name of the duty. The Mineral Rights Duty is a tax on the annual rental value of mining rights.

Exempt from these taxes are: All agricultural lands, except such as may be worth more for other purposes than they are for agriculture; all small holdings; and lands used for a public, or quasi-public purpose. Exempt, also, from the undeveloped land duty, is all land of that description which is worth less than £50 ($243) per acre. They are then taxes on urban and suburban lands and on mines.

The new Doomsday Book.

The first and third, and to a lesser extent, the second of these taxes, involved establishing the value and character of all the land of England, at a given date, as the point of beginning. The value to be established was the capital value. As the English people reckon value very often in rental or annual value, and frequently without reference to the capital or principal value, this was a somewhat novel mode of approach. More so, at all events, than it would be in this country. They are the only English taxes, except the inheritance taxes, levied according to capital value.

All land was to be included in the valuation because the fact of its taxability or exemption had to be established, and moreover, because any given piece might at any time pass from the exempt to the taxable class or classes. The date selected as the point of beginning was the 30th of April, 1909. This date was long before the final passage of the act. It was the day after the budget speech by Mr. Lloyd George, Chancellor of the Exchequer, in which the new taxes were proposed. Owing to the opposition of the House of Lords, necessitating an appeal to the country, and a new parliamentary election, the act was not passed for a year, less a day, after the date with reference to which the values were to be determined. This was a concession to the landowners, as it was assumed that the mere announcement of the proposed taxes depressed the value of land. Hence, to use the higher value, as of the day of the announcement, rather than the depressed value after the announcement, meant using a smaller value for the taxable increments.

The new taxes, therefore, involved writing a new Doomsday Book, a record, or register, as it is variously called, or a *cadastre* of all lands in the United Kingdom, and their ownership, as they stood on the 30th of April, 1909. This was a gigantic undertaking, the more so as it had to be done practically *de novo,* there being nothing of the kind in existence save the basic maps. It was estimated that it would take four years and that it would cost, when completed, approximately £2,000,000, or nearly $10,000,000. In April, 1913, when, it is perhaps safe to assume, the work was at or near its height, it is reported that there were 4,153 officials employed and that their annual salaries were £492,620. It was reported at a recent date, January, 1916, that the survey had been completed as to 95 per cent of the land, but further work thereon had been suspended on account of the war. The enforcement of the taxes, however, necessarily involves a continuance of a large part of the staff. The cost of the Doomsday Book may be regarded as a capital investment good for many years to come. It was the original plan to have the values revised once every five years, although this revision would have little to do with the enforcement of the taxes or the determination of their amount except as to the undeveloped land duty.

The administration.

The making of the Doomsday Book and the whole administration is in the hands of the Commissioners of the Inland Revenues. The country was originally divided into 128 districts in each of which there is a head valuer, whose work is supervised by traveling inspectors. The administration was highly centralized, nothing being finally passed until approved by the commissioners. Hearings of interested parties were also provided for. The assessment districts being large the officer in charge was a man of responsibility. As one of the best known facts concerning landed property in England is the rental value, that served largely in determining the capital value.

Land. The meaning of the term.

Thus far we have used the term "land" loosely. It is necessary before going further to note the meaning of that term in English law. By the so-called "Interpretation Act" of 1889, Parliament decreed that unless the contrary intention appears, the expression "land shall include messuages, tenements, and hereditaments, houses and buildings of any tenure."* For this the nearest American equivalent in tax law is "real estate and any interest therein." Thus we must bear in mind then that in English law "land" is not merely the God-given soil, or the surface of the earth, but minerals under and man-made improvements on and under the surface. This, however, is not what is taxable under these taxes. It is only the "site value" which is taxable. This is a somewhat intricate conception and difficult to arrive at. For the first we may say that "site value" is approximately what the American would call the value of the "bare land," or what our tax laws mean by land values when they distinguish between land and the improvements thereon, if we exclude improvements like grading, drainage or embankments.

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*"Messuage," it may not be amiss to explain, means a dwelling house, with its appurtenant buildings, yards and gardens. "Tenements and hereditaments," possibly best read together, sum up all property, or property rights, in land, or related to land present and future, temporary or permanent. The Finance (1909–10) Act, 1910, excludes "incorporeal hereditaments issuing or granted out of the land." Dr. Napier, the great legal authority, explains that this means generally "advowsons, tithes, rights of common, way, water and light, offices, dignities, franchises or rents," a miscellaneous list of privileges or burdens, which would theoretically increase or diminish the value of land or of the lands from which they spring, or on which they fall. As burdens on one piece they may enhance the value of other pieces to which they inure as a benefit. Thus, if the owner, or user, of one piece of land must leave light for a neighbor, the one loses and the other gains in value of the "incorporeal hereditament."

There is another term to which the English law gives a meaning different from that which it has in this country, and that is "owner." The act says that the term "owner" means the person "entitled in possession to the rents and profits of the land in virtue of any estate of freehold, except that where land is let on lease for a term of which more than fifty years are unexpired, the lessee under the lease, or if there are two or more such lessees, the lessee under the last created under lease, shall be deemed to be the owner instead of the person entitled to the rents and profits as aforesaid." Thus the tenant who has a long lease of which fifty years are unexpired, is to be regarded as the owner. As much of the land in England is leased this is important. The explanation of this provision seems to be that in the first place any increase in the value of the land would accrue to the tenant at least for the period that the lease still has to run, and in the second place, the increase that might accrue to the owner will, in any event, be covered by the second of the new duties, the Reversion Value Duty.

In the intricacies of English land tenure, simplified as that has been by legislation during the last century, there still remain some forms of landholding which are unknown and others which are uncommon in the United States, and what is more important to a clear understanding of the English law there are shades of meaning, wholly unfamiliar to us, which attach to those terms which are in common use in both countries. It is difficult for one not to the manner born to appreciate these differences. But there are some of them which it is necessary to try to distinguish. At the very beginning of the act we encounter the term "fee simple of the land." Dr. Napier says that "fee simple" is "the fullest and most complete right of ownership known to English law." Joshua Williams, the learned author of "The Law of Property," tells us that "English law recognizes property in, but not absolute ownership of, land." In fact, if not in theory "fee simple" is a right of ownership, not quite but yet very nearly, as complete and free as the rights conveyed by a United States patent. The Crown has theoretical rights in land which is held in fee simple that exceed our recognized governmental rights of eminent domain. But the exercise of these rights is not common. Possibly a helpful way of expressing the distinction, at least so far as transferability of title is concerned, is to say that the American conception of fee simple is less personal than the English. Thus we speak of "patented land" as if the patent were a concrete condition attaching to the land, although, of course, the owner's personal rights do arise from the patent. But the English use of the term "fee simple" suggests first of all the owner's personal rights and yet implies also a condition attaching to the land. For our present purpose this subtle distinction is of only minor importance since the act contemplates that the tax will reach every "interest in the land." Thus leasehold interests of all sorts are separately treated. But a mortgage on land is not considered an interest therein.

"Copyholds" and "customary freeholds" are two terms not known in the United States. They are forms of tenure little short of "fee simple." The act provides that these shall be resolved into their constituent elements and treated either as: (1) ownerships, or as (2) leases, according as their terms run. Thus, under the "Copyhold Act of 1894," or under the common law, copyholds and customary freeholds may be "enfranchised" and the "lord's seigniorial rights or interest in the land" released, by a bargain between the lord and the copyholder. The consideration which would have to be paid to obtain enfranchisement is treated as lessening the value of that interest in the land that is held under copyhold.

Relation of these taxes to other taxes.

These are new and additional taxes. They make, save in one minor point, no material change in prior existing taxes or government charges on land or on the income or rent therefrom. Thus the old land tax, if it has not been redeemed, goes on as before. There is some three and one-half million dollars of this old tax still collected each year. So, too, the local "rates," which are in various ways too complex to set forth here, relating to land or to its rentals, continue unchanged. A plan to donate half the proceeds of the new taxes to local highways, which was embodied in the act, has been abandoned. So these new taxes work no relief in local taxation directly. There is no change on account of the new taxes, in the income tax schedules A and B, which cover income received from land. Nor are the several inheritance taxes affected, save that in computing the principal value of an estate subject to these taxes, there is to be a deduction made equal to the amount of the increment tax paid on the same occasion. As this deduction is from the value, and not from the tax, it will make a relatively insignificant reduction in the death duties.

Theory of these taxes.

The general theory of these taxes seems to be that the "site value" of land, in so far as it is not attributable to any expenditure, skill or foresight on the part of the owners, and excluding such expenditure, is a result of social and economic progress, a consequence of the growth of population and therefore is a subject peculiarly fit for taxation. Under this theory then the increment in the value of land from time to time is preeminently a fit subject for taxation. By the same test the attempt to make a speculative profit by holding land idle and out of use is equally a proper subject of special taxation. The theory assumes that the increase of land values "is a perpetual stream of communal wealth deposited from year to year on the property of the fortunate owners of land" as Dr. Napier expresses it.

But these taxes are not the "single tax" of Henry George, nor do they approximate it. The resemblance is superficial and lies in the single fact that both taxes rest on the assumption that the increment of land values is the result of the growth of population. The object of the single tax is to take from the owner of land the enjoyment of the annual value of the ground rent. But the increment value tax leaves the owner in full enjoyment of the rentals until an "occasion" arises and then takes only a part. The single tax makes the government at least a partner with the owner, if not the owner in chief, but the increment taxes make the government a quasi-heir to the owner's interest, or to a part thereof. Furthermore, these taxes might, conceivably, be defended on the same grounds that higher rates for the income tax have been applied to some kinds of income. Thus, if it is proper to tax income from investments, "lazy incomes," as Gladstone called them, more heavily than incomes which are gained from work, then it might be urged that the increment in the value of one's land is a very "lazy" income.

Further light is thrown on the theory of these taxes by the meaning that is given to the "site value" that is to be the basis of the tax. Site value has been variously described as "the prairie value" or as the "pure economic rent" of land. A given piece of land in its present state ready to be built upon, may have been drained or graded, roads may have been built to provide access to it, the old land tax, or the old tithe, originally a church contribution, on it may have been redeemed, parks, squares and boulevards may have been laid out at the owner's expense to enhance its attractiveness, and advertising may have lent it popularity or created a vogue for it. Whatever value any of these things or other things, if done at the owner's or his ancestors' expense, may add to the value of the land is excluded from the taxable site value. It is not, however, prairie value alone but that plus the value that has been added by the community through growth of population and the development of its institutions, good schools, churches, public works and the observance of law and order and the like. On the other hand, the land may be subject also to burdens, fixed charges, easements, restrictions, or cumbered by buildings, forests or shrubs, unsuited to its proper use, all of which lessen its value. Dr. Napier points out that "It may, indeed, be that the assessable site value is a minus quantity, as where the nominal value of a rent charge issuing out of the land, either of itself or with the cost of roads, drainage or embankment exceeds the value of the land free from that charge." What is subject to the tax is then pure economic rent or the value of the "original and indestructible powers of the soil," in the market as that market is now constituted.

Exemptions.

The theory of the tax would have required that it should be imposed on all land, but agricultural lands were exempted. It was stated by the proponents of the new taxes that they would eventually be extended to cover all land, but agricultural land in England at the time of the imposition of these taxes was not advancing but declining in value. It was claimed that agricultural land had decreased in value from 1878 to the time the act was proposed by between 20 and 25 per cent. These taxes are, therefore, primarily taxes on city lands, and fall especially on suburban lands, the value of which it is said has been increasing rapidly.

How the site value is to be determined.

How the site value is arrived at and assessed is of peculiar interest. The act is very explicit on this point, and has been supplemented and interpreted by rulings of the Commissioners of the Inland Revenue so it is possible to get at this very fully.

While the values are to be finally fixed by the commissioners, the taxpayers must assist, and any one connected with the use of the land may be called upon to assist in the work. As we shall see, the assessment requires a great deal of information, and the administration was regarded by the landowners as extremely "inquisitorial." Most of the opposition centered around one of the schedules or reports that the landowner is required to file. This was known as "Form IV," which had to be filled out by every "owner of land and by any person receiving rent in respect of land." In a way it appealed to divergent interests, since it makes the landlord tell tales on his tenant and the tenant on his landlord. It is a cumbersome schedule, this "Form IV," a really appalling document. It calls for information on everything that can possibly throw light on the value. The owner may fix a value which then must be "considered" but is in no way binding or limiting on the commissioners. The latter must, however, submit a "provisional" valuation, to which the owner has the privilege of objecting. Finally, an appeal lies to a referee and from him to the courts.*

The definition of value is that it shall be the value which it would be expected that land would realize "if sold * * * in the open market by a willing seller in its then condition." This definition contains as many doubtful elements as do the American property tax value definitions. But who can frame a better one?

The four values.

There are in all four different values which the commissioners are to fix, three of which enter into the computation being used to ascertain the fourth. They are: (1) the "gross value"; (2) the "full site" value; (3) the "total value," and (4) the "assessable site value." The definitions given in the act are:

> "The gross value of land means the amount which the fee simple of the land, if sold at the time in the open market by a willing seller in its then condition, free from incumbrances, and from any burden, charge, or restriction (other than rates or taxes) might be expected to realize.
>
> "The full site value of land means the amount which remains after deducting from the gross value of the land the difference (if any) between that value and the value which the fee simple of the land, if sold at the time in the open market by a willing seller, might be expected to realize if the land were divested of any buildings and of any other structures (including fixed or attached machinery) on, in, or under the surface, which are appurtenant to or used in connection with any such buildings, and of all growing timber, fruit trees, fruit bushes, and other things growing thereon.
>
> "The total value of land means the gross value after deducting the amount by which the gross value would be diminished if the land were sold subject to any fixed charges and to any public rights of way or any public rights of user, and to any rights of common and to any easements affecting the land, and to any covenant or agreement restricting the use of the land entered into or made before the thirtieth day of April, 1909, and to any covenant or agreement restricting the use of the land entered into or made on or after that date, if, in the opinion of the commissioners, the restraint imposed by the covenant or agreement so entered into or made on or after that date was when imposed desirable in the interests of the public, or in view of the character and surroundings of the neighborhood and the opinion of the commissioners shall in this case be subject to an appeal to the referee, whose decision shall be final.

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*The intervention of the courts has held up the revenues. But this is another matter, which can not be taken up in this paper.

> "The assessable site value of land means the total value after deducting—
>
> (*a*) The same amount as is to be deducted for the purpose of arriving at full site value from gross value; and
>
> (*b*) Any part of the total value which is proved to the commissioners to be directly attributable to works executed, or expenditure of a capital nature (including any expenses of advertisement) incurred *bona fide* by or on behalf of or solely in the interests of any person interested in the land for the purpose of improving the value of the land as building land, or for the purpose of any business, trade, or industry other than agriculture; and
>
> (*c*) Any part of the total value which is proved to the commissioners to be directly attributable to the appropriation of any land or to the gift of any land by any person interested in the land for the purpose of streets, roads, paths, squares, gardens, or other open spaces for the use of the public; and
>
> (*d*) Any part of the total value which is proved to the commissioners to be directly attributable to the expenditure of money on the redemption of any land tax, or any fixed charge, or on the enfranchisement of copyhold land or customary freeholds, or on effecting the release of any covenant or agreement restricting the use of land which may be taken into account in ascertaining the total value of the land, or to goodwill or any other matter which is personal to the owner, occupier, or other person interested for the time being in the land; and
>
> (*e*) Any sums which, in the opinion of the commissioners, it would be necessary to expend in order to divest the land of buildings, timber, trees, or other things of which it is to be taken to be divested for the purpose of arriving at the full site value from the gross value of the land, and of which it would be necessary to divest the land for the purpose of realizing the full site value.
>
> Where any works executed or expenditure incurred for the purpose of improving the value of the land for agriculture have actually improved the value of the land as building land, or for the purpose of any business, trade, or industry other than agriculture, the works or expenditures shall, for the purposes of this provision, be treated as having been executed or incurred also for the latter purposes."

At first reading the definitions and the method they prescribe seem round about and involved. It requires a little study to see what they mean and the reasons for the involved language. Thus it seems strange to be told that to find the "total value" you must take from the "gross value" the difference between the "total value" and the "gross value." Surely if one knows the "total value" to begin with, why compute it?

The fact is that the "total value" is substantially the market value of the land in the broad sense, including the improvements. It will be, in most instances, the first ascertainable quantity; an ascertainable fact. It is the price that is paid when the ''land'' is sold. The ''gross value'' is a hypothetical quantity, set up merely to call attention to certain factors which, in most cases, diminish the ''site value'' but are not necessarily included in the ''total value,'' in fact are generally reasons why the ''total value'' is low. These factors are, according to Dr. Napier, ''easements, fixed charges, and restrictions arising out of contract and many other burdens.''*

The ''total value'' or the market price would, generally speaking, be less than the gross value. It is, of course, conceivable that a given piece of land might enjoy rights from or over other lands of a greater aggregate value than the easements it granted to other lands. But as most of these easements and the like are to the public, the usual effect is that the gross exceeds the total value. Yet, although the gross value is hypothetical it is not necessarily hard to arrive at. Dr. Napier suggests that it is what the man in the street estimates to be the value of a given house looking at it from the street and knowing nothing of the easements, fixed charges and other burdens attaching to the title. The rules of the commissioners direct the valuers to arrive at the gross value by ''an independent calculation and without *necessarily* being bound by the actual consideration paid.'' To illustrate: An experienced valuer, viewing a factory building and site, decides that it is worth, say £10,000. He finds, however, that it actually sold for £8,000. On inquiry he finds that it is subject to a right of way leading to a neighboring factory, and that another neighbor has a right to free space for air and light, and that the property must pay the upkeep of a little park in front of it. These easements account for the difference. By considering these easements separately and in the light of the gross value he has more information than he would otherwise have as to the reasonableness of the ''total value.'' Furthermore, ''gross value'' is useful in equalizing between different pieces of property, the more especially as the relative values are disturbed by the easements.

''Full site value'' is also defined in the same roundabout way as ''total value.'' It would have seemed simpler to have said that it is the ''total value,'' less what a buyer would include in that value for the buildings, plus the value of the easements which make up the difference between ''gross'' and ''total'' value. The treatment of the value of the buildings and other structures is very interesting and suggestive. The most important thing is the emphasis laid on the idea that buildings and other structures are to be valued, not at cost, nor at reproduction cost, nor depreciated cost, but simply and solely at what they add to the value of the entire complex of which they form a part. In the same way expenditures on the site to adapt it to use are valued not at what they cost but at what they add to the site without reference to cost. A sea wall may add greatly more than its cost to the value of a salt marsh. Again, there are to be deducted "any sums * * * it would be necessary to expend in order to divest the land of buildings, timber, etc." The reason for this curious provision is that the act had in contemplation lands on the suburbs of cities, from which the old farm buildings and other stuff would have to be removed before it could be used for building purposes. Again, we find that a deduction may be allowed for "expenses of advertising." That is, intangible as well as tangible values attaching to the land and resulting from the owner's own efforts or expenditures are to be deducted. Even "good will or any other matter personal to the owner" is to be deducted.

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*Form IV enumerates six groups of such items.

The wide extent to which lands in England are leased, to which reference has already been made, makes it necessary to split up the interests in many cases. Rents for lands, annuities paid out of them and the like, have to be separated. This is done by computing the present values of the different incomes, whether for a fixed term of years, for life, and so on. It is interesting to note that in making these computations 4 per cent was used for computing the values of the fee simple and 6 per cent for computing leasehold interests.

The occasions.

The increment value duty is levied and is payable on occasions. The occasions are: (1) the transfer or sale of the fee simple of the land or of any interest in the land, or the grant of a lease for over fourteen years, unless the contract for the sale or the lease was made before the act took effect, *i. e.,* April 29, 1910; (2) on the death of any person dying after the passage of the act where the fee simple of the land or any interest therein is subject to the estate duty;* (3) where the land is held by a body corporate or its equivalent, then the occasions on which the tax is levied are the 5th of April, 1914, and every subsequent fifteenth year thereafter. But the tax is then payable, if the corporate body so elect, in fifteen annual installments. The granting of a short lease, that is one for not more than fourteen years, is not an occasion.

The basis of the tax.

On each occasion the "site value" is reascertained in substantially the same manner as it was for the new Doomsday Book. If there has been a sale of course the price paid is the important matter. Each interest is separately assessed, but the tax applies only to the one that is the subject of the occasion. The unit is each piece in separate occupation or use.

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*The estate duty is the chief inheritance tax. Unlike most American inheritance taxes, it is levied on the estate of the deceased, not on the distributive shares, which, in England, are subject to another tax.

The tax is levied on the ''increment value,'' or the difference between the ''site value'' as assessed on the ''occasion'' and the ''original site value'' set down in the new Doomsday Book, if the former exceed the latter. No duty is payable unless the increment is more than 10 per cent of the original site value and the duty is collected only on that part of the increment which exceeds this 10 per cent. The duty on the 10 per cent is ''considered paid,'' which is a curious sounding provision, but one that has its effect on the computation of the tax on subsequent ''occasions.'' If on occasions after the first the increment is not more than 10 per cent of the site value on the last occasion preceding no duty is due, and so on. But these deductions may not be accumulated so as to exceed 25 per cent of the original value in any period of five years. These 10 per cent deductions are explained as covering any expense the owner may have been put to by the act and as a margin for possible mistakes in the valuations. No duty is payable unless the site value on an occasion exceeds the original site value. Thus, if a piece of land shrinks in value and then later recovers but does not exceed the original value, no duty is payable on the increment from the low value to which it fell.

It will be observed that it is in the interest of the owner to have a high value placed upon the property in the first instance. Consequently those owners who had reason to claim that their lands were depreciated on the 30th of April, 1909, had a grievance. They were given relief in 1911, when the act was amended permitting them to substitute any value, which they could prove, by evidence, such as a sale, had been the value during a period of twenty years prior to April 30, 1909.

The rate.

The rate of the Increment Value Duty is one pound in every full five pounds of taxable value. That is one-fifth, or 20 per cent, of the increment in value is to be taken by the government, whenever the owner harvests the increment.

Collection.

The duty is collected as a stamp tax on the instrument of transfer. Thus, if it is not paid the transfer is invalid and the instrument worthless so that the vendee will see to it that the stamps are attached.

Illustrative examples.

Let us assume that there is a lot of land known as Whiteacre, which is a factory site and on which there is a suitable factory building. On

April 30, 1909, it was found to be worth: "Gross value" £10,000; "total value," £9,000; "full site value," £2,000. Then, by the rule laid down in the definitions the "original assessable site value" is £9,000—(£10,000—£2,000)—the sum of the various deductions. If it appeared that there had been expended on a retaining wall £100, for street work £300, to redeem the old land tax of £5 per annum, £100, then the total of the deductions is £500. Then 9,000 less 8,000 less 500 gives 500, and the assessable "site value" is £500.

Let us now assume that A is the owner of the fee simple and that there is no lease or other interest in the land. On January 1, 1912, A sells the fee to B for a price which by the same method as was followed above but with, of course, new values for the different items, gives a new "site value" of £1,000. This, then, is the first "occasion" on which the tax is to be paid. The tax is one-fifth of the difference between £1,000 and £500, or £100, but the amount to be paid is only £90 because the tax on one-tenth of the original site value is "considered as paid."

A year later B leases the property to C for 99 years. For the purposes of this tax the lease is considered in the same light as a sale. On this the second "occasion" for the imposition of the tax the "site value" is found from computing the value on the basis of the rent to be £1,250. The increment accruing to B is £250. He would apparently be entitled to a deduction (or to "consider as paid") for the tax on 10 per cent of £1,000, or £20 in tax. But it will be observed that this £100, plus the £50 allowed to A on the first "occasion" makes £150 which exceeds 25 per cent of the original site value of £500 and is, therefore, more than is allowed in any one five-year period. Hence the calculation is changed about: £500 plus 25 per cent of itself is £625. The total increment duty that can be collected is, therefore, £125, that is, one-fifth of the difference between £1,250 and £625. But of that total, £90 has been paid by A, so the tax on B is £125 less £90, or £35. He thus pays £5 extra for making his money so fast.

Twenty years later, C underleases the property for 21 years to D. There are now three parties at interest: D, who has the property in use; C, who holds D's lease and has a reversion in expectancy on his own leasehold interest after 21 years, or for a period of 58 years remaining after D's lease falls in; and B, who has a reversion in expectancy after 79 years. The consideration for the lease paid or agreed to be paid by D and other factors now show a site value of £2,000 on this third "occasion." The last site value was £1,250, hence the increment on this "occasion" is £750, and in computing the tax there is to be deducted the tax on 10 per cent of £1,250, leaving a tax computable of £125. But this has to be apportioned between C and B, only one of whom, namely C, has realized his increment. The computation is as follows: £2,000, the site value, at 4 per cent, would yield £80 a year; £80 a year for the next 58 years, the term of D's lease, is worth now £1,794, 8s. Hence, C's interest is to B's interest as 1,794.4 is to 2,000. C, therefore, pays that fraction of £125, or £116, 12s, 9d.

The incidence of this tax.

The imposition of these taxes, nay, even their first whispered announcement, at once depressed the value of land. This is not only in accordance with the accepted theory of the incidence of these taxes, but an acknowledgment of that effect is written into the act itself in several important particulars. First, there was the rule that the original site value should be reckoned as of a date before the effect of the announcement of the new taxes was felt. Second, there was the concession that the highest price that was obtained at any time during twenty years before the new taxes were levied should be the basis from which to start. The consequence was that the owner at the time of the imposition of the tax was obliged to assume the whole burden of the tax forever, in so far as the amounts thereof could be foreseen. For each purchaser or lessee would naturally deduct from the price he would be willing to pay the "present value" or capitalized value of the tax that he would have to pay and also that of the taxes which his successors would have to pay and which in turn they would deduct from him. In computing the effect there are two uncertain factors—one is the amount of the increment, and the other is the times when the occasions will occur. These two uncertainties introduce into the study of the incidence of these taxes certain very interesting and complex considerations which will be considered in another place.

THE REVERSION DUTY.

The reversion duty in England rests on a practice common in that country and not nearly so common in the United States of leasing land for long terms. The lessee then builds on the land, makes various improvements and may, under the conditions of the original lease, sublet. At the termination of the lease the whole property reverts to the owner of the fee. The terms of the leases are usually such as to protect the interests of the various parties. But they vary greatly. If, for example, it is expected that the buildings put up by the tenant will outlast the lease, or if he is required by the lease to keep such improvements as will outlast the lease, then there may be some compensation to be paid by the landlord at the termination of the lease, or it may be that he makes an abatement in the rent charge to cover such improvements. But since all the developments of the future can not be foreseen when a long lease is written it not infrequently happens that a considerable windfall accrues to the landlord. This is the more likely to happen in the case of land that is rapidly appreciating in value. It was to cover these windfalls, which are somewhat akin to an "unearned increment" that the Reversion Duty was added to the list of the new taxes. That, despite all attempts to equalize the benefits which may have been made in the original lease an added value is found to fall to the landlord, is stated by Dr. Napier as follows: "It usually happens that on the expiration of a building lease the owner of the fee simple expectant upon the lease comes into a property worth much more than the fee simple of the property at the time when his predecessor in title made the lease." This profit, consisting of the increase in site value and whatever building or improvement values there may be over and above what was anticipated by the terms of the lease written long years before is the subject of the reversion duty.

The theory of the tax is that the owner of the fee simple has received a safe interest on his money or investment for many years and on the termination of the lease gets back his money or the principal with added values. Such a "windfall" is to be shared with the government. Since the holder of a long lease is regarded as the owner with reference to underleases it may also fall on a tenant.

The rate of the reversion duty is one pound in every full ten pounds of the value of the benefit accruing by the reversion. The rate is lower than that of the increment duty by reason of the fact that the benefit is not wholly economic rent. In proportion to the value of the whole property it is possible, however, that in many cases this tax will be heavier than the increment value duty. It is apparently not intended that an increment duty and a reversion duty shall both be collected for that portion of the benefit which is increment in the site value, in case the "occasions" overlap or coincide.

For obvious reasons the values and methods of valuation for the reversion duty are not those for the increment value duty. In the first place the thing to be valued includes buildings as well as the underlying earth. The original value, moreover, is that at the time the lease was written and is to be computed on the basis of all payments and considerations in the lease. The value of the property at the end of the lease is our old friend, "total value," as explained in connection with the increment value duty. There is deducted from this before the original value is subtracted the present value attributable to any expenditure by the lessor during the life of the lease, and any compensation he may have to pay to the lessee by the terms of the lease.

Exempt from this duty are agricultural lands, and leases for short terms which for this purpose are those not exceeding twenty-one years, leases covered by the Mineral Rights Duty, and leases of public property, or such as is used for charitable, educational and other quasi public purposes not resulting in private profit.

The reversion duty is not a lien on the property. The beneficiary of the reversion must report to the commissioners under heavy penalty for failure. But there is no danger that the collection will be jeopardized, because there is in England so much publicity as to the essential facts arising under the administration of the income tax and of the local rates that concealment from the officials is practically impossible.

Numerical Example.

Selling value of the entire property at the end of the lease		£2,000
Expended by lessor on betterments	£300	
Compensation for fixtures	200	
Total deductions		500
Amount that the lessor receives by reversion		£1,500
Original values:		
Premium paid for lease	£300	
Annual rental of £20, taken at twenty-five years' purchase	500	
Total original		800
Benefit taxable		£700

Tax at 10 per cent, £70.

THE UNDEVELOPED LAND DUTY.

Undeveloped land is defined as follows: "Land shall be deemed to be undeveloped land if it has not been developed by the erection of dwelling houses or of buildings for the purpose of any business, or trade, or industry other than agriculture." Land once developed may revert by virtue of nonuse, or owing to the buildings becoming derelict. Land in process of development, or being marketed, is considered developed if £100 per acre has been spent on roads, sewers, etc., within the past ten years.

The assessment is on our old friend the "assessable site value," ascertained as explained above. For the first five years the assessment is on the "original site value" as of the 30th of April, 1909. A new assessment or valuation is to be made every five years. In the interval between the quinquennial assessments lands passing into the "undeveloped" class must be valued. When the increment tax has been paid the "site value" is reduced by the amount of the increment that was taxed.

Exempt are: Land whose site value is less than £50 per acre; parks, woodlands and the like devoted to public use, or recreation, or to which the public enjoys access amounting to a public benefit. In the case of undeveloped land actually in use for agriculture, if the site value be over £50 per acre, and the site value for purposes other than agriculture exceeds the value for agriculture, the excess is considered the undeveloped value, and that excess is taxable. But small holdings of this class not worth over £500 are exempt. A free acre of land is allowed with a dwelling house, and gardens or pleasure grounds not in excess of five acres, whose value for the purposes of building, etc., does not exceed twenty times the annual value adopted for the income tax, are exempt.

The rate.

The rate of the undeveloped land duty is one-half penny for every twenty shillings of assessable site value. Interpreted in the common terms of American tax rates, the rate is $2.08 per thousand, or twenty cents and eight mills per $100, or two mills and a little over per $1.00. By itself it is a trivial tax. But conjoined to and added to the other taxes and charges falling on land it is not unimportant. As the tax could not be determined until the valuation was completed it was made payable retroactively to and for the year ending March 31, 1910, and each subsequent year.

The tax is a sort of penalty for not using the land or for not selling or leasing it so that it may be used.

The tax is not expressly made a lien on the land, but the act contains the dictum that the tax "shall be borne by that owner (*i. e.* 'the owner for the time being' presumably when assessed) nothwithstanding any contract to the contrary." It is not very probable that the tax can be shifted by the owner, but if it should be the case that economic forces dictate a shifting, say to the purchaser, this dictum of the law will be as potent as Canute's command to the tide, of which it smacks.

Numerical illustration.

This tax is so simple in the main that no example is necessary, except for the case of land used for agriculture pending the opportunity to sell it at a profit. Thus "Blackacre" may have an agricultural value of £500 and a "site value," in view of the growth of the neighboring town, of £1,000. The duty is on the difference, or £500. If subsequently leased for market gardens its agricultural value may rise to £700 and at the same time the site value for a factory may be £1,500, then the duty is on the £800.

MINERAL RIGHTS DUTY.

The fourth of the new duties proved to be the largest revenue getter, during the first period of the life of the new taxes. Down to the 31st of March, 1913, it had yielded in all £1,250,000 ($6,087,000), while all the other three together yielded only £250,000 ($1,217,000).

The tax with which we now deal is not a tax on the capital value of the minerals. It is a tax on the annual or rental value, a basis as familiar to the English people as it is unfamiliar to us. It is based on the annual rental value of all rights to work minerals and of all mineral way-leaves.* The rate is one shilling for every twenty shillings of the rental value paid by the working lessee, or its estimated equivalent if the proprietor works the mine himself. The year for the rental is the year ending September 30th. If the proprietor receives an increased rent in consideration of making developments, the amount he expends on the development is deducted. If the working lessee holds from one who is himself a lessee, intermediate between the proprietor and the working lessee, the latter may deduct from the rent he pays the proportionate part of the tax. Clay, brick clay, or brick earth, sand, chalk, limestone and gravel are not minerals subject to the duty.

The reversion duty is not payable on the termination of a mining lease, nor is the grant of such a lease an ''occasion'' under the increment value duty.

But although mineral rights are subject to such a heavy tax that is not all of these new taxes which may fall on minerals in some cases. In the first place, when minerals are sold, apart from the land, as if they were a separate parcel of land, they are liable, as other land, to the increment value duty, on their capital value. The same is true if they pass by death when they are not being worked.

Minerals which were being worked at the time of the passage of the act and continue to be worked without an idle period of two years or more, pay only the Mineral Rights Duty.

But special provisions as to the Increment Value Duty are made to apply to minerals opened and worked that were not being worked when the act was passed, or which may be opened and worked after any period of two years or more of idleness. In such cases there is an ingenious application of the Increment Value Duty which turns it from a lump sum ''occasional'' tax into an annual tax. In assessing this form of the increment value duty the first step is to ascertain the original capital value at the time the act was passed, or on becoming idle for a period of more than two years. This is done as nearly as may be according to the methods already explained for ascertaining site values. The next step is to compute the annual value corresponding to this capital value, which is fixed at ''two twenty-fifths parts of the capital value,'' which cumbersome fraction is, of course, equivalent to 8 per cent. If, when the minerals are worked, the annual rental in any year exceeds the sum fixed by the second step as the original value, then the increment tax is based on that excess. If, however, a part of the rental is return for capital expended in development work during the fifteen years, a deduction is allowed.

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*A "way-leave" is the right to convey minerals over or under private lands, or to use shafts or tunnels for ventilation, or drainage, passing over or under private land

It is not intended that both the annual Increment Value Tax and the full Mineral Rights Duty shall be paid, but whichever is the higher is the measure of the total to be paid, the other, if paid, being allowed as a deduction.

GENERAL COMMENT ON ALL FOUR TAXES.

As we have seen, these four taxes are cunningly woven together. The undeveloped land tax might appear to stand alone, but there is one important respect in which it holds up the others. It has been noted that for the Increment Value Duty the owner will endeavor to have a high value fixed in the original assessment, for then the taxable increment thereafter will be smaller. But if he succeeds in this endeavor and his land is "undeveloped" he will have to pay a higher undeveloped land duty than otherwise. Then, too, a high original value fixed for the Increment Value Duty may rise up to plague his heirs when the estate duties (inheritance taxes) have to be paid. Moreover, there is always the possibility of increased rates.

Aside from one or two harsh features the act is full of tenderness and mercy for the taxpayer. The taxes, except for the undeveloped land duty, fall only on realized values, and deductions and exemptions are allowed with the utmost liberality. In some cases the allowances, as for example those for advertising and good will, are almost fanciful.

The yield.

The Report of the Commissioners of His Majesty's Inland Revenue for the year ended March 31, 1915, gives the following as the "Net Receipts" of the several duties, for each of the five years since they have been in force:

Duty	Year 1910-11	Year 1911-12	Year 1912-13	Year 1913-14	Year 1914-15	All five years
Increment Value Duty	£127	£6,127	£16,981	£34,199	£48,316	£105,750
Reversion Duty	257	22,621	47,974	80,435	19,313	170,600
Undeveloped Land Duty	2,351	28,947	97,852	274,916	8,652	412,718
Mineral Rights Duty	506,290	436,193	273,915	345,343	337,680	1,899,421
Totals	£509,025	£493,888	£436,722	£734,893	£413,961	£2,588,489

There are several features of these results that need a little explanation.

The only one of these duties that went into full effect at once was the Mineral Rights Duty. The others could not even begin until the new Doomsday Book was completed. By March, 1915, it was reported 95 per cent of all the land in Great Britain had been valued. The report, however, states that owing to the depletion of the staff by mobilization and the departure to the war of the owners and others who had a voice in the valuations all further work on the valuations was suspended. In 1914 the collection of the Reversion Duty and of the Undeveloped Land Duty were suspended by court decisions adverse to certain features of the valuation method. In the nature of things the Increment Value Duty could not be expected to yield much at first as the "increment" ripens only with the passage of time.

I have tried to guess what the rate of increment was. This can not be done with any accuracy, as the Report does not give the "assessable site" value; it gives only "total values." The "total values" for all lands is reported as £4,555,285,522. The "occasion" valuations made for the purposes of Increment Value Duty to March 31, 1915, gave £490,920,918. How much of this was site value it is impossible to ascertain. Various writers (see Stamp, British Incomes and Property, pp. 339 ff.), have estimated the site value as being anywhere from one-fifth to one-half of the total value. The best guess seems to be one-third. In number the "units" which were revalued were about one-tenth the whole original number of valuations made, and if we allow for the increment about one-tenth of the original values were revalued. So that it is possible to guess that the pieces revalued were fairly representative of the whole. Beyond this point the estimate is still further guesswork. The only sure facts are the total increment duty assessed which was £153,234, representing a total increment taxed of £766,170. On each of the pieces taxed there was exempt 10 per cent of the original site value, whatever that was, and of the greater mass of the revalued properties the increment was less than 10 per cent, nil, or minus. The best that can be done is to guess that the 9,937 lucky pieces that were also so unfortunate as to have to pay the tax increased in value not more than 14 per cent in the five years. But this is only a very rash guess.

The incidence of increment value taxes.

The most interesting scientific problem in connection with these taxes is their incidence, upon whom do they fall and how.

For a study of this the essential features of increment value land taxes are: (1) that they are based on the increase in the capital value of land; (2) that they are assessed and collected on "occasions" at more or less irregular intervals of time, when some event such as a sale or a transfer on account of death permits the increase in value to be ascertained.

According to the prevailing theory of the incidence of all land taxes the burden falls on the owners and not on the tenants or any indirect users, such as those who consume the products of the land. Also, in so far as the future taxes can be calculated in advance, the burden of them is capitalized and thrown entirely upon those who are owners at the time of their enactment, that is, so far as any future owner is concerned the tax is amortized, is dead, in that he acquires the property at its value, based on all earnings, less a sum which put at interest would pay the taxes. This general rule, applicable to all kinds of land taxes, would have little bearing if the taxes were made so heavy as to appropriate the full annual ground rental (in that case not merely the increment) and thus materially alter the entire economic organization of society.

This broad principle being accepted the next problem is to calculate the amount of the depreciation in the private property value of the land (the total use value not being affected) which will be occasioned by the enactment of a law imposing any given increment value tax. This problem differs from that presented by a tax based on the entire capital value of land payable at regular intervals, and from any regularly recurrent tax that takes a definite proportion of the annual rental value. In both of these cases we have only to capitalize the amount of the annual tax and the result is the amount by which the value of the land is depreciated. The main difficulty in the case of increment value taxes arises from the fact that the increment value tax leaves the owner in full enjoyment of the rentals until an ''occasion'' arises. Thus they can never appropriate or destroy all present value. The depreciation caused is therefore less than that which would be caused by a regular annual tax in approximately an equal amount. Further, unless it is to his interest to sell the land, the owner will not have to pay the tax until his death.

Inasmuch as the increment taxes are uncertain as to the date of their payment they become, so far as calculable, at all in advance, insurable risks, and to that extent they are analogous to any foreseeable inheritance tax, which may be insured against as a risk. Indeed, in some aspects, these taxes are analogous to an added inheritance tax imposed on inheritances in the form of landed estate.

In their more common forms and in the case of the British increment taxes these taxes are primarily for revenue purposes and only incidentally, or in lesser degree, designed to change existing social and economic conditions. Thus the maximum rate of the British increment value duty is less than 20 per cent of the increment. Similarly, the German Imperial Zuwachssteuer has a rate which approaches 30 per cent of the increment as a limit. If, for fiscal or for social reasons, the rate should eventually be raised so as to approach 100 per cent, the whole problem is altered, the effect will be different not merely in degree, but in kind, since it would influence one of the main motives to land ownership.

Every increment value tax, at the time of its enactment, predicates two values in land. One is the present value, and the other is the future increase in that value. But on closer analysis the present value in turn contains two elements; one is the capitalized value of the income that is now being received or which could hypothetically be received by using the land, assuming that this will not decrease in the future; and, two, the present value of such additions to the income as are expected to accrue in the future, in so far as those additions can be foreseen at the present time. There may be, some day in the future, now unexpected additions to the income (real or potential), the so-called windfalls which will, on the day they can be foreseen, add to the value of the land. But these add nothing to the present value. The increment value tax falls on two elements, one represented in the present value of the land and one not. Only in so far as it falls on the value of the expectation of future value now represented, in discounted form, in the present value can the increment tax reduce present values. The tax on the unexpected will in turn fall entirely on him who is the owner at the time the unexpected becomes foreseeable.

The depreciation, therefore, that will result from the enactment of an increment value tax is that due to the necessity of providing a fund for the care of the reduction in value caused by the tax as an invasion of the expected increase.

Although so far as any selected pieces of land are concerned, the future increase in values may prove to be very irregular, yet the new taxes, regarded as revenue measures, obviously assume that by and large there will be a steady growth in land values. To study the effect on present values we must assume some rate of growth and for simplicity it must be a regular rate. What rate to assume is a question which involves some difficulties. If, as economists teach us, rent is to be looked at as a differential value attaching to certain pieces of land as compared with the least advantageous piece of land (no value land) then the propriety of adding these differentials together and striking an average is decidedly questionable. But if rent, as most business men seem to hold, is to be regarded as the differential value attaching to land as against all other possible uses of funds, then we may properly strike an average. This is, perhaps, the attitude of the average investor.

As a preliminary example and to illustrate the method which it is here proposed to use, let us take the case of a landowner who confidently expects that his rentals will increase 10 per cent every seven years, and who does not now intend to sell and hence assumes that the first tax will be paid on the "occasion" of his death. If his expectation of life is twenty-eight years he might set down the end of the twenty-eighth year as the time or "occasion" for the payment of the first tax.

Theoretically we might set up the hypothesis that the increment will go on growing forever. But this has no practical meaning. Such an assumption soon runs into those unreasonable figures which one plays with in computing compound interest, for example, since the year of our Lord. Practically the business man's horizon is always limited. He expects the increase to stop somewhere, and it is not an unreasonable assumption that he will refuse to pay good money down now for any hoped for gain beyond, say, the average expectations of life of his group, or, let us say, more or less arbitrarily, beyond twenty-eight years. Hence we may assume that he will regard the rentals as settling down to a straight perpetuity after twenty-eight years.

The following examples are worked on the basis of 4 per cent interest and all capital values relate to $1.00 a year rental to begin with.

Under the foregoing assumption our landowner would reckon somewhat as follows:

I am to receive $1.00 a year for the first seven years;

Then $1.10 a year for the second period of seven years;

Then, $1.21 a year for the third period of seven years;

Then, $1.331 a year for the fourth period of seven years.

At the end of the twenty-eighth year I shall have, to pass on, a property yielding $1.4641 a year and worth then at 4 per cent, $36.60 for every $1.00 of present income.

As twenty-eight years is my expectation of life, my heirs will then have to pay the Increment Value Duty on this which I believe will be the first "occasion."

Now the present value of the series of annual payments above set down, plus the present value of $36.60 to be received twenty-eight years hence, would be $30.924, provided there were no tax to pay. But it is less by the present value of the tax, and being less the tax is correspondingly a trifle larger than one-fifth of the difference between one and one-tenth times $30.924 and $36.60. To find the present value as influenced by the increment value duty we proceed as follows: The present value of the property equals $30.924, less the present value of the tax. The tax equals one-fifth the difference between $36.60 and 1.10 times the present value of the land. From this it is easily computed that the present value equals $30.74, and the tax is $0.557 payable twenty-eight years hence. The reduction in present value caused by the tax is $0.1856 which is 0.6 per cent of the value unaffected by the tax.

If we were to assume that the rentals double every seven years for twenty-eight years the present value is $169.18, the future value $400, the tax $14.26, and the reduction 7.77 per cent.

These illustrations will suffice to show the principles.

Some of the propositions concerning these taxes are interesting:

(A) If there be any material exemption based on a percentage of original value, as in the British tax, the more frequently the "occasions" occur, the less the revenue. Thus, in our first example when the property was assumed to increase in value 10 per cent every seven years, if an "occasion" fell every seventh year there would be no revenue at all.

Hence, in a country where transfers of land are frequent, the exemption (or abatement) should take the form of a percentage of the increment or a lower tax rate, and not of the original value.

(B) Even if the tax is 100 per cent of the increment, the present value is never entirely wiped out nor is the owner deprived of all enjoyment of the increments. Thus, if we assume that land will double in value every seven years (which is certainly very rapid), and the tax takes the whole increment, and that the first occasion is at the end of twenty-eight years, the present value is still $75.10 per $1.00 rental at the start as against $183.45 untaxed (or $25.00, if there were no expected increment).

(C) For any considerable area of land the increment value taxes are not likely to yield much revenue, unless the rates are very high and the exemption or abatement next to nothing.

(D) Under any conditions that are at all within the reasonable expectations, the yield of an increment value tax will be very small for the early years. It takes considerable time for the increments to ripen.

The incidence of the undeveloped land duty.

The effect of the Undeveloped Land Duty is simpler than that of the Increment Value Duty. Thus, in the English tax it is one-half penny in the pound value, or a little over one-fifth of 1 per cent, and if the land were to stay undeveloped means that for every $100 of value before the tax the new value would be $95. But as it is natural that undeveloped land should ripen in some period of time and the tax disappear, the effect is less. The tax at one-fifth of 1 per cent for each dollar a year income for fourteen years is about $2.01. Hence, under this supposition the value is reduced from $100 to $98.

Comparison of the British increment value duty with the general property tax.

Under the general property tax the increment of value in land becomes subject to taxation as fast as it matures. Thus, if a piece of land is worth $1,000, and seven years hence is found to be worth $1,500, it will then be assessed on the basis of $1,500, the $500 of increment value being included. Moreover, as long as this value continues to exist, it is taxed at the regular rates of the general property tax.

If we take the same examples which we used to illustrate the working of the British Increment Value Duty, namely: (1) a case in which the value increases 10 per cent every seven years up to the twenty-eighth year; and (2) a case in which the value increases 100 per cent every seven years up to the twenty-eighth year, we have the following computations as to the results of the general property tax, assuming the tax rate to be 1 per cent of the true value, and 4 per cent as a basis of capitalization.

Example No. 1.

For every $1.00 of income (ground rent) which the owner is receiving, the government is also receiving 25 cents. Both the owner's and the government's shares increase by the condition of the problem 10 per cent every seven years. Thus the taxes on the increment alone will be—

For the 8th to the 14th years, inclusive, at $.025	$.175
For the 15th to the 21st years, inclusive, at .0525	.3675
For the 21st to the 28th years, inclusive, at .08275	.57925
Total taxes	$1.12175

and further, the government continues presumably forever thereafter to collect $0.116025 a year on the accumulated increment alone.

Under the British increment value tax the increment was found to be taxed $0.557 and this sum was not collected until the twenty-eighth year. Its present value is $0.1856. Now the present value of the series of taxes on the increment alone under the general property tax, including the perpetuity, is $1.48. But of this we may use only four-fifths for comparison with the $0.1856 of the British increment tax, because that was computed on the basis of $1.00 a year total ground rent, and the $1.48 for the general property tax was computed on the basis of $1.25 a year total ground rent of which $1.00 went to the owner and $0.25 to the government. Hence the comparison is between $0.1856 (British) and $1.184 (general property tax), or 6.38 fold.

Thus we find that the general property tax on the increment is more than six times as heavy in the related example as is the British increment tax.

But it must be borne in mind that the effect of the permanent appropriation of 1 per cent of the capital value of all land (including the value of the increment) lessens materially the value of all private ownership of land. The series of rent payments on land assumed in our example which we found above to be worth $30.924 untaxed would, if subject to the general property tax at 1 per cent, be worth only $24.74.

Example No. 2.

If the land doubled in value every seven years for twenty-eight years, then following the same method as above the government would collect in taxes on the increment alone under the general property tax, $20.25, and have a tax interest of $3.75 a year in perpetuity thereafter, all on the increment alone.

This series of taxes (including the perpetuity) has a present value of $39.51 and four-fifths of that is $31.61. As against this the British increment value tax would be $42.78 receivable twenty-eight years hence of a present value of $14.26. In this example the general property tax is 2.2 times as heavy as the British increment tax. The present value of the private owner's interest in the land under the general property tax would be $115.15 as against $169.18 under the British increment value tax.

If, therefore, the aims of the increment tax are: (1) to get revenue from the increment value, and (2) to reduce the social significance of land ownership, it is clear that the method of increment taxation, unless the rate is much higher than that of the British increment value tax, is much inferior to the general property tax even at so low a tax rate as 1 per cent.

In short, we are getting much more in taxation out of the increment in land value in the United States today than Great Britain could ever get by the increment value tax at its rate of one-fifth of the taxable increment, and, for that matter, even at much higher rates.

Furthermore, as frequent transfers will nullify the British tax while they merely serve to enhance the general property tax revenues, the effectiveness of the general property tax is still greater.

PUBLIC SENTIMENT ON TAX PROBLEMS.

In August last this commission issued a preliminary discussion of the general subject of taxation. This foreword, accompanied by a questionnaire, was sent to persons in the various counties who had expressed an interest in the problems being studied by this commission. The purpose of the questionnaire was to ascertain public sentiment upon various phases of the tax problem.

Over six hundred replies were received, expressing the views of individuals representing practically all occupations and professions. Replies also were received from civic organizations and chambers of commerce. The answers took a wide range, and furnished the commission with many valuable suggestions not included in the questions propounded. Many of the answers expressed an appreciation of the opportunity afforded the public, through the preliminary discussion and the questionnaire, to participate in the solution of the state's tax problem.

An analysis of the various answers to the questionnaire shows the following results:

Question No. 1.

> "Would you favor the exemption from taxation of all factories and manufactured products?"

One hundred and eighty-nine persons favored the exemption, while 409 were against it. Those favoring such an exemption believe such a plan would encourage factories, thereby increasing population and land values. Others favored the exemption of the manufactured product but not the factory itself.

Those who were against the exemption believed that such a measure would be in the nature of a special privilege and therefore dangerous; that it would be an unfortunate precedent and would tend to stimulate undue investment in certain kinds of industry. Some favored an exemption during the period of infancy of the industry.

Question No. 2.

> "If most of our public revenue continues to come from property taxation, do you believe any property should be exempt from paying, in some way, its percentage of such tax? If so, what property would you exempt?"

Three hundred and forty persons answered in the affirmative, and 250 in the negative. The general impression seemed to be that churches, schools and public buildings should continue to be exempted. A few favored fraternal halls. Single taxers favored the exemption of everything except land values. Some would exempt no property except that devoted exclusively to public use.

Question No. 3.

> "Would you favor the discontinuance of the tax on personal property and the adoption of a reasonable income tax in its place?"

The tabulation of the answers to this question is on the basis of the first part of the question only—the entire exemption of personal property. There were 272 in favor and 284 against such exemption. Some expressed themselves in favor of an income tax without exemption and many indicated a desire for partial exemption of personal property with the adoption of an income tax.

Question No. 4.

> "Do you believe improvements on land (houses, trees, etc.) should be taxed in the same proportion as the land itself?"

Answers to this question stood 189 for and 393 against. Over two-thirds of the persons answering believed that improvements should be taxed less than the land. Many believed that improvements should not be taxed at all.

Those who favored the present tax regard improvements as an investment that should bear its proportion of the burden along with all other investments and should be taxed in the same proportion as land.

Question No. 5.

> "Do you favor the gradual reduction of taxation upon buildings, trees and vines and the assumption of that tax burden by the land?"

Three hundred and fifty-five answered in favor and 215 against. It is obvious that nearly all persons who answered No. 4 in the negative would answer this question in the affirmative. Many were in favor of a rapid reduction of the tax.

Question No. 6.

> "It is argued that land values in cities and other social centers are greatly augmented by the amount of population and that the community itself, and not any effort on the part of the owner of the land, gives it the high value. If this is true, do you, or do you not believe that a man who gains this extra wealth from the community, instead of by his own efforts, should pay a greater tax proportionately?"

Three hundred and eighty-three answered in favor and 185 against. Many seemed to think that the question answered itself. Those who replied in the negative were mostly of the opinion that people who invest in land are taking a certain amount of risk, and that they are therefore entitled to the increased value. Some advanced the idea that a heavier tax of this nature would be a fine upon business prudence and foresight.

Question No. 7.

> "If you state in your answer to the preceding question that you are in favor of a greater tax upon unearned land values, then what percentage of this unearned value do you believe should rightly come back to the community, instead of being retained by the owner?"

This question was dependent upon the preceding questions and, as a rule, was not answered at any length.

Question No. 8.

> "Do you believe that land held for speculation should be taxed heavier than the land used for home, agricultural or business purposes?"

Two hundred and eighty-six were in favor of a heavier tax and 285 were not. Those who answered in the affirmative gave generally as their reason that speculation was the cause of our land problem and an additional tax would curb the evil. The chief reasons given against such a proposition were that it appeared to be unscientific and that it would be impossible for the assessor to tell whether the land was being held for speculation or whether the owner failed to improve simply because he lacked means with which to make the improvement.

Question No. 9.

> "Do you favor the idea of setting aside certain classes of property to be taxed for certain purposes (for instance, for state or county purposes solely) without regard to the relative burden of tax borne by the different classes of property?"

This question was usually answered in the negative, many persons stating that they believed all property of the same class should bear a like burden of tax.

Question No. 10.

> "Do you favor classifying property according to its earning ability and taxing it in proportion to that ability?"

A majority of the answers (313 to 217) were in favor of classifying property according to its earning ability, but many of those who favored such a plan added many qualifications to their answers.

Question No. 11.

> "Do you favor a system of indirect taxation for city and county governments, similar to that now used by the state?"

A large majority were against a system of indirect taxation for local purposes. It was generally opposed, using the argument that an indirect tax can usually be shifted upon the consumer and also opens up opportunities for many inequalities.

Classified Returns from Questionnaires.

Occupation	Favoring Single Tax.	Number of answers	Quest. No. 1		Quest. No. 2		Quest. No. 3		Quest. No. 4		Quest. No 5		Quest. No. 6		Quest. No. 8		Quest. No. 9		Quest. No 10		Quest. No 11	
			Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Attorneys-at-Law	6	61	20	39	36	21	35	24	25	35	38	21	32	22	28	31	12	43	27	25	10	33
Bankers		40	7	33	18	22	14	25	18	20	16	23	20	19	12	28	4	30	18	20	14	18
Civil and Mech. Engineers	1	9	4	5	5	4	6	2	4	5	7	2	7	2	5	4	1	6	6	3		7
Corporation Officials	1	6	1	5	1	5		5	2	4	3	3	4	2	3	3	1	5	1	4		5
Educators	4	20	7	13	13	16	10	6	5	14	15	5	17	1	13	6	4	9	4	8	6	10
Farmers	4	80	13	66	40	38	23	50	33	42	35	40	38	35	36	40	11	48	18	26	16	32
Fruit Growers	1	27	4	21	16	9	13	12	6	18	13	8	13	8	15	9	6	11	15	11	4	10
Lumbermen	2	8	1	7	4	4	4	4	3	5	5	2	6	2	1	6	1	6	3	5	1	5
Manufacturers	2	10	7	3	8	2	4	5	1	9	9	1	8	2	3	7	1	6	5	5	1	6
Merchants	3	41	8	33	28	11	13	26	13	23	22	17	24	13	21	15	5	28	24	10	5	13
Mining Interests	1	12	3	9	6	5	7	4	4	8	7	4	8	3	7	5		8	7	3	3	4
Newspapermen	20	46	26	20	34	10	34	13	6	40	36	10	35	11	28	18	11	30	30	14	5	28
Physicians	5	31	10	21	19	12	9	16	6	25	22	9	24	1	15	15	3	20	16	9	4	12
Representatives of public bodies		7	2	5	4	3	1	5	2	5	4	3	6	1	5	2	2	3	5	2	2	2
Public Officials	9	70	16	54	30	39	31	37	24	47	40	25	43	27	31	35	7	42	30	24	8	33
Real Estate and Insurance	4	45	11	31	25	19	20	22	21	24	20	25	24	19	15	27	7	29	32	12	8	27
Miscellaneous	25	92	49	41	53	30	48	28	16	69	63	17	74	11	48	31	17	49	42	36	16	44
Totals	88	*605	189	409	340	250	272	281	189	393	355	215	383	185	286	285	93	373	313	217	103	289

*Includes advocates of Single Tax.

TABULATION OF TAX STATISTICS.

In the following pages will be found many tables of figures gathered by this commission in its investigation. They form a valuable and permanent record of statistics for present and future use in arriving at deductions in revenue and taxation matters.

Among other tables will be found the classified returns of answers to the questionnaire mailed by this commission in August to representative citizens in each of the counties of the state. A perusal of this table will prove of peculiar interest. There is also a table showing individual land holdings of over 2,000 acres from the counties in which the commission was able to obtain reports. This information, though not complete, vividly shows the existence of grave land problems in the state. A table of timber land holdings from most of the timber counties, showing assessments and appraised values, is given, which sets forth important facts in connection with the timber land situation in the state.

Tables are presented showing the assessed values of nonoperative properties for 1915 and 1916 in each of the counties of the state, segregated in such a manner as to show the assessed values inside and outside of incorporated cities of land, improvements, personal property, money and credits. Likewise, similar information will be found regarding inside and outside operative property of public service corporations in the various counties for both years.

Summarized abstracts of reports made by general corporations for the year 1915 are presented. The reports of over 18,000 of these corporations were examined, and a segregation made into 238 different classes, depending upon the kind of business that the corporation was transacting. These classes were again segregated into subdivisions showing reports of corporations having gross receipts not exceeding $10,000, gross receipts from $10,000 to $20,000, $20,000 to $50,000, $50,000 to $150,000, $150,000 to $500,000 and gross receipts exceeding $500,000. These figures show that the present system of assessing the franchise values of corporations is inequitable and that the smaller corporations are undoubtedly bearing the heavier burden of taxation.

As has been stated in the report, the actual values of properties in thirty-eight counties were obtained by selecting properties in each of the said counties and having those properties appraised by competent appraisers. There will be found a summarized report of this appraisement for each county, showing the actual value arrived at for inside land, inside improvements and outside acreage. Because crops and trees were appraised as part of the outside land value no segregation is made of outside land and outside improvements. Inside property, however, has been segregated into business and residential property.

Following the table of appraisals will be found a table of ratios deduced from the appraisals and assessments of property appraised, showing the ratio of assessed to actual value to each of the various segregations of property in each of the counties. Much information of local interest is obtainable from the study of these ratios.

By applying the ratios applicable to the assessed value of inside land and inside improvements and outside property, the actual values of these properties in each county were obtained and from these figures was worked out the general ratio of assessed to actual values for personal property and money and credits in each county. In counties where no appraisals were made the actual values were obtained by applying the general average ratio obtained from actual values in the thirty-eight counties in which appraisals were made.

The population of each of the counties and of the cities were estimated by applying the ratio between the average daily school attendance and the federal census in 1910 to the average daily school attendance in 1915.

There is also included a summary of rental incomes from various parts of the state, together with a summary of the state and county tax upon the property rented.

SCHEDULE 1.

Summary of Assessed Values of Nonoperative Property as Reported by County Auditors to the State Tax Commission for 1915.

County	Land, inside	Land, outside	Improvements, inside	Improvements, outside	Personal property, inside	Personal property, outside	Money and credits, inside	Money and credits, outside
Alameda	$129,081,725	$18,967,511	$60,417,725	$3,722,850	$18,921,216	$1,738,675	$1,904,875	$27,325
Alpine	-----	467,868	-----	108,200	-----	76,414	-----	-----
Amador	331,100	3,248,743	559,548	1,096,419	162,508	529,185	-----	500
Butte	1,329,010	10,427,520	2,296,135	2,618,755	953,555	2,307,825	16,170	45,750
Calaveras	146,435	4,347,865	356,055	1,368,685	91,390	752,585	500	13,660
Colusa	300,095	11,102,185	471,025	1,043,780	196,370	1,506,816	12,200	3,080
Contra Costa	11,431,995	15,718,710	6,874,990	5,986,860	2,162,400	5,396,677	100,655	532,475
Del Norte	112,230	4,411,107	135,535	108,730	110,250	182,750	-----	-----
El Dorado	192,650	3,741,240	425,945	713,495	165,990	700,665	1,975	200
Fresno	13,464,210	38,764,605	9,121,790	10,073,910	4,056,817	8,288,996	257,419	58,829
Glenn	900,087	11,504,592	683,070	676,494	301,692	1,586,874	365	6,000
Humboldt	4,347,595	20,234,660	2,650,530	1,588,375	1,064,958	1,968,315	73,935	17,244
Imperial	3,329,984	14,685,994	1,886,885	895,859	950,016	2,954,621	-----	-----
Inyo	360,010	4,940,860	289,575	894,065	171,255	963,675	1,025	8,327
Kern	4,133,615	42,279,129	3,757,050	8,177,396	1,657,460	13,412,405	2,475	4,200
Kings	858,475	8,942,860	1,076,665	1,231,815	638,519	2,208,891	19,528	1,595
Lake	290,110	3,111,645	203,340	721,100	82,500	550,935	5,050	24,420
Lassen	88,065	4,923,770	339,310	495,378	135,665	1,602,630	7,800	18,203
Los Angeles	322,733,760	117,658,250	157,873,190	17,585,580	66,529,985	13,831,680	11,122,330	501,585
Madera	487,240	10,455,240	427,990	770,515	218,955	1,307,170	690	2,175
Marin	5,757,975	7,910,470	4,565,445	1,611,010	733,935	823,440	3,065	450
Mariposa	-----	2,205,894	-----	514,467	-----	576,461	-----	1,300
Mendocino	992,670	10,389,016	1,120,520	1,165,055	717,685	1,568,318	32,914	14,770
Merced	768,650	15,485,610	956,380	2,119,400	424,065	3,044,740	-----	-----
Modoc	109,305	4,812,925	214,625	793,138	87,574	1,626,631	6,840	98,010
Mono	-----	637,775	-----	171,945	-----	327,980	-----	1,600
Monterey	3,599,363	17,269,622	2,442,398	2,425,565	817,571	3,636,070	-----	2,430
Napa	2,143,005	6,101,360	2,757,475	2,741,105	1,102,735	1,509,950	50,720	2,055
Nevada	444,730	2,710,430	1,218,805	1,318,385	347,735	578,405	14,765	200
Orange	8,369,820	21,530,835	4,842,500	4,110,300	2,441,965	6,881,705	17,565	53,985

Placer	982,830	6,451,375	1,439,285	1,415,225	391,821	471,315	3,550	8,500
Plumas		5,134,001		722,200		1,031,929		23,212
Riverside	6,818,335	11,468,695	5,503,285	1,810,745	1,461,265	967,470		
Sacramento	35,739,070	19,944,124	17,643,620	2,798,650	5,824,830	2,785,190	322,950	20,050
San Benito	543,465	4,933,825	662,265	901,200	271,130	1,079,140		
San Bernardino	10,124,365	15,961,450	7,990,540	5,466,020	1,687,366	1,129,057	17,475	1,190
San Diego	43,093,062	9,061,187	9,757,875	1,151,050	5,352,473	1,091,475	151,726	69,349
San Francisco	304,288,151		172,526,327		45,942,943		15,935,329	
San Joaquin	10,529,379	26,320,188	10,368,237	3,899,090	4,297,939	3,085,701	137,644	47,080
San Luis Obispo	1,005,155	8,936,368	1,805,601	1,724,384	738,714	4,680,521	4,594	1,200
San Mateo	7,891,285	14,561,570	3,729,840	5,274,315	178,020	1,854,695	216,250	130,000
Santa Barbara	4,236,320	12,454,435	4,969,410	2,664,915	1,565,870	3,883,275	8,100	3,000
Santa Clara	18,461,325	28,608,445	13,831,375	9,523,065	3,656,155	3,078,295	379,510	310,080
Santa Cruz	5,373,365	5,675,785	3,293,015	2,251,760	1,045,590	956,815	9,425	1,330
Shasta	505,795	8,016,570	888,470	1,639,410	355,610	1,003,240		
Sierra	117,190	1,523,430	147,135	313,120	69,300	158,320		1,510
Siskiyou	481,050	11,322,090	1,127,000	1,274,620	528,030	2,439,895	46,940	70,765
Solano	2,225,555	12,442,074	3,475,755	2,426,725	1,176,789	1,516,428	14,365	6,350
Sonoma	4,220,715	16,871,525	5,100,900	5,777,870	2,048,755	3,117,250	121,640	35,575
Stanislaus	2,295,740	16,486,790	2,700,960	3,252,435	1,140,755	3,157,020	85,390	36,510
Sutter	199,875	8,795,665	251,105	983,155	79,425	1,101,260		51,810
Tehama	652,945	8,437,365	1,218,295	1,220,655	575,965	1,820,380	33,925	76,240
Trinity		2,467,355		266,965		139,325		6,900
Tulare	2,941,850	27,244,910	3,172,515	6,009,910	1,252,730	3,937,725	7,690	38,850
Tuolumne	270,406	4,650,425	574,985	1,632,350	200,811	677,719	2,296	1,605
Ventura	2,236,400	19,660,795	1,559,910	1,800,270	1,014,789	2,130,710	3,180	7,507
Yolo	829,305	11,756,210	1,513,760	1,853,075	551,785	2,060,145	5,400	28,000
Yuba	861,905	3,720,240	1,374,795	462,235	711,990	1,254,805	6,010	1,820
Totals	$983,331,717	$764,928,183	$541,590,791	$145,693,845	$187,365,616	$133,350,584	$31,176,160	$2,418,801

SCHEDULE 2.

Summary of Non-operative Property as Obtained from County Auditors by the State Tax Commission for 1916.

County	Land, inside	Land, outside	Improvements, inside	Improvements, outside	Personal property, inside	Personal property, outside	Money and credits, inside	Money and credits, outside	Total
Alameda	$128,462,625	$19,085,466	$61,717,800	$3,956,900	$18,842,761	$1,734,150	$1,602,705	$47,825	$235,450,232
Alpine	------	467,373	------	108,555	------	69,344	------	------	645,272
Amador	354,180	3,371,548	657,115	1,017,805	135,429	617,164	------	------	6,153,241
Butte	1,329,430	10,790,375	2,331,645	2,579,585	982,725	2,159,620	10,790	21,470	20,205,640
Calaveras	128,230	4,473,715	318,485	1,385,540	90,990	895,680	------	12,420	7,305,060
Colusa	307,560	11,112,665	477,060	1,129,805	221,601	1,533,479	3,400	31,070	14,816,640
Contra Costa	10,524,925	15,888,460	7,055,965	7,616,330	3,510,241	5,151,595	113,200	1,976,045	51,836,761
Del Norte	120,605	4,348,645	151,410	115,445	125,150	127,155	------	250	4,988,660
El Dorado	193,015	4,812,630	435,985	665,970	184,195	716,435	600	------	7,008,830
Fresno	13,423,295	39,818,135	9,416,120	9,770,253	4,453,639	8,479,446	217,527	72,605	85,651,020
Glenn	469,655	11,260,304	939,320	1,251,145	403,588	2,336,929	14,350	------	16,675,291
Humboldt	4,332,955	20,066,795	2,661,320	1,599,150	1,041,362	1,947,130	43,645	17,478	31,709,835
Imperial	2,724,516	16,443,817	1,866,300	1,118,346	1,290,668	2,683,560	------	------	26,127,207
Inyo	360,355	5,058,206	290,475	909,665	173,225	1,053,856	2,445	9,343	7,857,570
Kern	4,138,135	42,362,903	3,855,025	8,461,489	1,587,537	14,940,066	725	3,555	75,352,435
Kings	919,990	9,525,980	1,108,000	1,201,705	561,400	2,354,640	12,705	740	15,685,160
Lake	285,935	3,118,800	205,785	722,905	70,715	515,210	3,370	12,280	4,935,000
Lassen	93,306	4,927,225	245,705	595,648	116,287	1,695,670	3,929	24,198	7,701,968
Los Angeles	421,916,695	111,697,205	152,731,580	17,152,200	67,348,001	13,694,112	12,942,608	403,820	797,886,221
Madera	555,630	10,839,740	432,735	673,665	221,064	1,405,595	78	------	14,128,507
Marin	6,081,320	7,800,720	4,658,070	1,565,840	929,180	878,275	9,045	5,000	21,927,450
Mariposa	------	2,261,113	------	501,766	------	620,104	------	1,455	3,384,438
Mendocino	1,371,450	10,210,230	1,140,540	1,181,625	684,888	1,760,690	36,533	34,840	16,420,796
Merced	901,400	15,434,425	1,042,900	1,815,930	482,965	3,457,270	------	------	23,134,890
Modoc	110,230	4,826,470	221,905	808,335	87,505	1,663,741	2,150	126,765	7,847,101
Mono	------	1,367,335	------	265,185	------	417,950	------	------	2,050,470
Monterey	3,550,797	18,060,194	2,528,940	2,497,240	867,896	3,626,292	500	------	31,131,859
Napa	2,294,290	6,766,630	2,866,625	2,792,575	1,168,940	1,480,570	43,105	3,950	17,416,685
Nevada	453,345	2,844,080	1,217,050	1,307,445	365,735	568,100	22,230	200	6,778,185
Orange	6,467,380	23,787,070	4,617,950	4,918,140	4,018,780	5,655,695	49,155	12,620	49,586,790

Placer	880,015	5,359,445	1,426,840	1,325,375	412,290	515,439	11,050	7,000	9,937,454
Plumas		5,368,396		746,575		1,077,060		24,571	7,216,602
Riverside	6,721,840	11,894,483	6,010,790	1,927,690	1,496,750	1,073,040			29,124,593
Sacramento	35,110,780	20,761,996	16,883,080	2,950,190	5,760,390	2,898,400	555,400	60,160	84,980,396
San Benito	598,580	5,421,505	664,895	926,275	314,750	1,205,370			9,131,375
San Bernardino	7,021,315	19,693,645	5,693,535	8,012,620	1,374,405	1,851,830	20,935	5,080	43,673,365
San Diego	43,589,254	9,783,728	9,990,270	1,453,630	5,441,011	1,225,635	961,686	15,698	72,460,912
San Francisco	302,575,489		175,387,605		40,861,429		23,738,533		542,563,056
San Joaquin	10,782,249	26,558,077	10,884,650	4,198,482	4,553,994	3,189,993	220,352	36,789	60,424,586
San Luis Obispo	961,355	8,906,608	1,825,905	1,889,096	701,216	4,885,499		1,100	19,170,779
San Mateo	7,539,620	14,567,765	4,257,165	5,399,715	1,171,670	896,550	231,300	59,650	34,123,435
Santa Barbara	4,470,505	12,965,925	5,469,795	2,501,165	1,758,075	4,040,975	10,200		31,216,640
Santa Clara	18,550,670	28,637,210	14,012,615	9,696,275	3,567,140	3,133,725	307,810	364,025	78,269,470
Santa Cruz	5,368,025	5,618,730	3,276,235	2,251,150	1,051,440	831,110	5,090	2,710	18,434,490
Shasta	564,800	9,584,995	856,110	1,690,095	407,100	1,249,330			14,352,430
Sierra	113,835	1,538,265	121,915	317,800	47,560	153,070		1,785	2,294,230
Siskiyou	496,580	11,392,480	1,117,875	1,158,215	527,039	2,566,701	15,050	39,295	17,313,235
Solano	2,253,990	12,520,130	3,577,440	2,477,815	1,256,361	1,639,555	14,142	4,450	23,743,883
Sonoma	4,210,675	16,910,415	5,146,435	5,733,075	1,955,900	2,745,415	130,085	15,860	36,847,860
Stanislaus	2,297,790	16,479,740	2,811,700	3,508,605	1,103,900	3,319,440	97,940	37,980	29,657,095
Sutter	197,185	8,779,550	253,155	1,039,015	79,620	1,209,960		23,850	11,582,365
Tehama	661,225	8,432,190	1,247,545	1,119,630	535,420	1,777,720	41,530	34,470	13,879,730
Trinity		2,490,005		307,300		403,000		8,115	3,208,420
Tulare	2,879,940	27,071,675	3,222,370	6,472,950	1,309,660	4,073,155	21,360	15,770	45,069,880
Tuolumne	272,310	4,531,377	580,095	1,521,645	198,578	802,225	1,696	1,420	7,909,346
Ventura	2,426,085	19,535,065	1,758,520	1,777,510	2,979,260	396,650	3,000	7,565	28,883,655
Yolo	739,700	14,740,240	1,616,290	1,916,940	476,635	2,003,370	6,000	16,300	21,515,475
Yuba	850,650	3,666,480	1,389,700	466,960	701,615	1,455,340	7,335	1,300	8,539,380
Totals	$1,074,005,711	$776,068,374	$544,674,340	$152,535,010	$190,039,675	$134,859,080	$41,538,289	$3,602,872	$2,917,323,351

SCHEDULE 3.

Summary of Assessed Values of Operative Property as Reported by County Auditors to State Tax Commission for 1915.

County	Land, inside	Land, outside	Improvements, inside	Improvements, outside	Personal property, inside	Personal property, outside	Money and credits, inside	Money and credits, outside
Alameda	$3,571,870	$48,750	$4,249,540	$191,657	$10,862,812	$193,716	$3,316,571	$71,000
Alpine	------	4,900	------	122,100	------	750	------	------
Amador	1,800	103,770	26,630	425,380	4,290	5,510	25,000	6,933
Butte	21,775	696,650	99,535	628,565	83,720	624,735	------	------
Calaveras	1,000	130,435	17,450	260,275	400	1,560	86,485	------
Colusa	10,650	------	------	------	244,129	------	------	------
Contra Costa	130,645	78,065	286,595	618,365	393,907	478,165	137,245	41,010
Del Norte	500	------	3,250	------	4,500	8,800	------	------
El Dorado	5,700	110,020	16,895	67,380	800	114,059	------	------
Fresno	252,435	48,675	166,855	1.277,565	1,663.670	1,840,360	276,255	------
Glenn	1,450	3,785	72,434	------	------	119,825	102,098	------
Humboldt	95,700	296,870	70,100	18,300	220,712	56,075	335,093	4,266
Imperial	70,720	178,880	198,579	321.469	743,736	129,184	------	------
Inyo	------	22,207	------	977,112	------	274,236	------	------
Kern	420,268	3,759,445	530,195	1.288,785	505,975	386,095	149,790	------
Kings	4,875	3,485	89,540	89,590	69,275	49,065	182,948	10,000
Lake	25	150	50	1,850	7,435	10,085	------	------
Lassen	------	6,814	------	34,684	19,478	96.565	------	------
Los Angeles	48,662,820	9,019,205	3,327,075	433,870	42,372,285	6,354,085	33,501,610	99,380
Madera	5,430	14,530	16.260	76,525	31,675	427.515	------	------
Marin	46,000	13,900	90,950	96.300	353,490	224,380	------	------
Mariposa	------	------	------	------	------	20,217	------	------
Mendocino	6,336	8,040	104,231	267.746	107,496	30,009	194,573	19,771
Merced	12,995	6,045	35,550	29,815	90,860	194,470	------	------
Modoc	60	530	11,186	62,570	7,727	3,250	------	------
Mono	------	1,550	------	19,350	------	60,820	------	------
Monterey	30,372	17,775	338,172	207,930	69,275	78,377	------	------
Napa	27,380	1,390	147,395	82,895	77,985	9,835	161,521	------
Nevada	4,075	22,925	74,675	610,480	23,045	42,845	106,575	22,290
Orange	90,020	102,355	46,920	26,005	1,643,850	1,666,835	157,475	27,600

Placer	21,815	34,005	81,152	830,370	10,199	236,725	63,010	7,900
Plumas		161,194		1,042,585		27,337		259,947
Riverside	53,190	29,030	286,125	170,865	538,130	274,775	217,360	13,745
Sacramento	1,733,590	233,500	1,740,160	355,970	2,868,020	556,010		
San Benito	1,915	2,010	34,505	30,365	34,925	25,365	247,755	
San Bernardino	1,757,440	1,661,308			1,854,655	790,300		
San Diego	634,150	15,395	590,751	94,075	2,856,431	129,346		
San Francisco	22,901,250		27,212,039		33,476,151		33,570,658	
San Joaquin	251,145	36,870	774,495	876,320	921,886	57,927	1,096,921	39,040
San Luis Obispo	13,290	7,445	99,171	186,253	228,351	41,273	185,762	10,070
San Mateo	41,425	73,850	56,000	26,200	333,230	479,830	86,965	2,500
Santa Barbara	51,250	24,660	76,350	34,975	868,350	295,117	520,423	21,315
Santa Clara	794,465	799,070	192,500	68,960	446,445	226,670	3,751,430	19,535
Santa Cruz	93,725	37,380	165,300	105,995	261,530	131,165	143,345	
Shasta	40,825	837,155			170,880	85,585		
Sierra	500	440	17,680	31,800	5,650	8,635		
Siskiyou	6,760	4,840	97,940	321,100	107,245	154,485	103,285	18,200
Solano	14,735	20,395	67,790	95,820	326,679	416,023	307,473	
Sonoma	56,190	23,110	116,045	255,029	432,555	339,462	362,320	27,125
Stanislaus		92,250		466,955		263,580		354,140
Sutter	1,075	5,810	29,274	156,712	3,645	75,137	37,200	
Tehama	31,845	161,320	62,645	215,530	42,610	15,135	143,180	
Trinity		17,840		17,025		17,565		
Tulare	72,990	53,740	285,390	1,521,205	166,570	18,200		
Tuolumne		309,130		292,705	33,859	160,429	237,500	54,800
Ventura	12,190	7,705	28,830	17,130	390,900	224,740	151,763	20,000
Yolo	20,970	21,355	19,000	24,570	112,535	268,950	231,540	15,120
Yuba	66,195	16,210	76,240	326,325	57,920	290	281,925	
Totals	$82,156,826	$19,391,163	$12,128,457	$15,807,402	$106,091,878	$18,791,779	$80,476,054	$1,195,687

SCHEDULE 4.

Summary of Assessed Values of Operative Property as Obtained from County Auditors by the State Tax Commission for 1916.

County	Land, inside	Land, outside	Improvements, inside	Improvements, outside	Personal property, inside	Personal property, outside	Money and credits, inside	Money and credits, outside
Alameda	$3,635,925	$58,175	$4,616,272	$207,188	$10,176,649	$198,366	$3,047,384	$40,200
Alpine		4,900		114,650				
Amador	1,950	27,900	41,545	462,465	6,430	33,255	32,000	
Butte	21,760	687,945	152,600	738,990	33,000	529,840		
Calaveras	1,000	139,535	2,850	269,375	500	3,200	86,185	
Colusa	3,950	1,780	3,800	8,100	28,025	111,536	208,308	68,908
Contra Costa	133,225	67,840	409,280	619,435	296,555	514,730	154,116	31,435
Del Norte	2,750				12,500	19,800		
El Dorado	2,275	110,025	20,145	67,162	800	62,895		
Fresno	254,405	48,245	167,855	1,263,745	1,859,170	1,841,139	337,605	
Glenn	1,900	8,550	2,150	18,500	139,940	119,797		
Humboldt	87,745	306,555	72,700	22,450	231,326	55,675	310,264	2,325
Imperial	68,895	174,023	195,234	370,813	46,563	54,074	825,365	82,235
Inyo		17,270		1,044,814		201,221		
Kern	513,495	2,464,120	539,185	1,360,245	437,905	1,638,625	357,155	9,505
Kings	4,570	3,640	110,345	119,430	27,385	23,580	268,455	10,000
Lake	25	200	50	2,100	7,960	9,485		
Lassen		3,924		97,893	14,599	62,509		
Los Angeles	59,915,770	7,882,520	3,574,835	356,700	67,268,655	6,582,115	36,835,410	97,710
Madera	18,035	14,450	12,150	111,685	29,210	407,900		
Marin	50,000	13,000	103,900	97,100	137,965	270,685		
Mariposa		215		19,900		2,432		
Mendocino	6,336	8,165	126,437	279,714	86,092	23,643	134,859	18,411
Merced	13,025	5,830	37,500	28,115	106,230	179,805		
Modoc	100	20	11,695	62,470	1,610	353		
Mono		50		2,150		5,620		
Monterey	40,420	11,170	67,625	48,625	309,493	250,045		
Napa	19,850	8,870	135,635	91,165	110,170	18,520	147,773	
Nevada	4,075	43,400	75,230	590,445	37,370	22,420	179,035	
Orange	102,375	96,205	48,220	29,105	1,685,785	1,442,165	650,420	467,280

Placer	73,285	79,467	74,472	956,414	3,578	5,105	63,010	-----
Plumas	-----	184,925	-----	1,067,760	-----	49,386	-----	273,695
Riverside	61,290	41,770	355,170	366,370	384,820	138,040	488,800	17,600
Sacramento	1,768,540	191,780	1,440,650	322,280	2,105,460	679,830	-----	-----
San Benito	5,605	36,565	2,265	32,655	39,220	30,875	299,915	-----
San Bernardino	371,970	121,465	1,689,935	1,724,465	1,950,070	841,390	2,535	-----
San Diego	592,815	15,715	592,724	143,615	3,155,006	117,695	-----	-----
San Francisco	8,040,400	-----	4,498,670	-----	149,832,646	-----	50,948,202	-----
San Joaquin	263,105	38,895	763,107	890,052	949,640	44,652	1,227,840	59,148
San Luis Obispo	14,190	14,755	261,583	117,467	73,455	49,964	225,172	-----
San Mateo	41,975	77,175	41,000	57,700	329,750	487,620	86,815	2,500
Santa Barbara	53,600	40,855	74,150	31,725	838,875	275,190	498,225	16,640
Santa Clara	820,570	195,600	848,750	69,935	440,350	203,970	3,786,965	75,690
Santa Cruz	86,605	35,860	173,460	204,160	256,520	70,930	272,830	-----
Shasta	8,600	8,315	40,000	744,655	33,320	114,230	142,280	-----
Sierra	500	440	17,680	27,400	5,825	8,915	-----	-----
Siskiyou	10,270	286,165	100,315	35,285	123,005	208,620	118,900	48,200
Solano	10,790	15,275	70,620	18,855	213,760	482,205	288,477	-----
Sonoma	55,980	23,160	106,780	261,700	372,635	334,110	378,390	29,850
Stanislaus	45,885	93,205	131,640	479,885	165,945	268,290	301,140	354,885
Sutter	450	5,925	3,474	45,043	25,010	185,764	28,225	-----
Tehama	25,055	158,655	56,895	222,725	36,335	15,085	148,035	-----
Trinity	-----	24,925	-----	17,300	-----	12,893	-----	-----
Tulare	69,850	43,565	263.820	1,549,865	169,470	46,090	-----	-----
Tuolumne	-----	310,530	-----	357,705	33,859	160,429	208,500	54,800
Ventura	11,190	10,425	29,040	18,580	414,766	266.220	83,857	20,000
Yolo	20,970	24,715	19,000	41,575	111,355	215,390	235,585	17,725
Yuba	60,510	78,040	100,150	270,100	15,080	1,600	314,575	-----
Totals	$77,417,856	$14,366,689	$22,282,588	$18,579,800	$245,171,642	$19,999,918	$103,722,907	$1,798,742

SCHEDULE 5.

Summary of Assessed Values of Operative Property as Reported by County Auditors to the State Tax Commission for 1915.

County	Inside railroad property, assessed value	Outside railroad property, assessed value	Inside railroad property, assessed by state board	Outside railroad property, assessed by state board	Total operative railroad property	Total operative
Alameda	$11,957,521	$240,252	$2,097,238	$3,097,655	$17,392,666	$27,700,809
Alpine						127,750
Amador	4,250	361,230		212,012	577,492	811,325
Butte	84,255	282,265	97,074	2,695,997	3,159,591	4,948,051
Calaveras		20,105		408,885	428,990	906,490
Colusa	14,542	69,245	7,297	978,132	1,069,216	1,240,208
Contra Costa	521,882	753,970	706,532	3,442,097	5,424,481	6,312,626
Del Norte						17,050
El Dorado	8,470	21,770	43,252	753,317	826,809	1,111,423
Fresno	729,900	1,071,760	401,625	7,792,671	9,995,956	13,720,111
Glenn	20,805	46,920	54,056	1,459,599	1,581,380	1,813,247
Humboldt	100,965	328,270	74,200	1,625,855	2,129,290	2,797,171
Imperial	179,844	460,604	3,831	2,773,763	3,418,042	4,418,162
Inyo		69,040		3,226,926	3,295,966	4,500,481
Kern	906,260	1,135,980		8,384,704	10,426,944	15,425,257
Kings	55,795	82,870	100,211	2,105,343	2,344,219	2,704,332
Lake						19,595
Lassen	210	89,755		2,622,204	2,712,169	2,779,745
Los Angeles	41,185,035	10,211,585	3,529,323	7,318,927	62,244,870	154,618,580
Madera	21,680	81,665	42,183	1,762,606	1,908,134	2,376,724
Marin	279,235	261,190	176,309	1,044,512	1,761,246	2,045,841
Mariposa		20,217		362,950	383,167	383,167
Mendocino	59,000	149,430	34,036	1,543,624	1,786,090	2,315,862
Merced	95,625	97,052	118,963	3,257,325	3,568,965	3,746,023
Modoc			3,379	230,746	234,119	319,448
Mono				690,797	690,797	772,517
Monterey	74,935	133,540	210,859	3,444,080	3,863,414	4,396,840
Napa	78,075	26,360	164,079	1,609,188	1,877,702	2,281,668
Nevada	18,950	100,520	8,589	798,677	926,736	1,714,176
Orange	153,735	268,265	746,250	2,570,023	3,738,273	7,017,333
Placer	55,415	479,055	167,236	2,349,955	3,051,661	3,802,367
Plumas		96,320		2,054,385	2,150,705	3,545,448
Riverside	148,270	176,860	862,340	4,713,787	5,901,257	7,159,347
Sacramento	2,179,080	204,300	548,115	3,292,986	6,224,481	11,328,351
San Benito	17,905	19,560		499,961	537,426	879,801
San Bernardino	1,650,905	1,306,965	954,247	16,541,080	20,453,197	23,559,030
San Diego	1,908,297	254,737	686,569	1,797,710	4,647,313	6,804,430
San Francisco				344,103	344,103	117,504,201
San Joaquin	817,615	512,881	595,704	5,083,381	7,009,581	9,736,689
San Luis Obispo	137,499	126,521	161,627	1,927,500	2,353,147	2,860,742
San Mateo	96,015	108,755	341,599	709,395	1,255,764	2,150,993
Santa Barbara	134,690	195,982	241,112	3,200,441	3,772,225	5,276,993
Santa Clara	528,450	840,565	375,836	2,140,485	3,885,336	8,818,396
Santa Cruz	153,685	139,429	160,179	1,129,854	1,583,147	2,229,473
Shasta	16,970	220,420	48,787	1,658,679	1,944,856	2,841,911
Sierra	2,008	4,950	34,278	84,483	125,719	186,466
Siskiyou	105,070	350,236	110,359	3,098,429	3,664,094	4,052,643
Solano	219,995	313,650	180,101	2,048,599	2,762,345	3,477,615
Sonoma	622,285	81,690	93,631	2,701,407	3,499,013	4,406,874
Stanislaus	91,825	267,265	105,872	2,755,583	3,220,545	4,038,380
Sutter	34,032	126,093	37,162	1,550,475	1,747,762	1,896,490
Tehama	69,645	89,255	93,544	1,237,844	1,490,288	2,003,953
Trinity				168,004	168,004	220,434
Tulare	242,805	539,025	361,205	5,563,887	6,706,922	8,076,187
Tuolumne		53,132		460,458	513,590	1,548,881
Ventura	89,030	133,280	227,258	2,665,900	3,115,468	3,746,416
Yolo	49,575	101,900	51,417	2,589,759	2,792,651	3,358,216
Yuba	50,425	12,840	179,786	1,117,206	1,360,257	2,122,107
Total	$65,972,460	$23,139,526	$15,237,250	$139,698,351	$244,047,581	$520,974,846

SCHEDULE 6.

Summary of Assessed Values of Operative Property as Reported by County Auditors to the State Tax Commission for 1916.

County	Inside railroad property, assessed value	Outside railroad property, assessed value	Inside railroad property, assessed by state board	Outside railroad property, assessed by state board	Total operative railroad property	Total operative
Alameda	$7,915,833	$2,000,085	$1,845,967	$3,416,303	$15,178,188	$27,242,429
Alpine	------------	------------	------------	------------	------------	119,550
Amador	------------	363,765	------------	212,230	575,995	817,775
Butte	98,255	172,900	106,413	3,365,398	3,742,966	5,635,946
Calaveras	3,600	15,695	2,660	406,194	428,149	911,799
Colusa	5,240	32,030	7,227	984,063	1,028,560	1,425,697
Contra Costa	1,900,010	727,080	708,160	3,454,647	6,789,897	6,389,423
Del Norte	------------	------------	------------	------------	------------	35,050
El Dorado	8,220	19,525	43,296	754,090	825,131	1,060,688
Fresno	819,592	1,152,124	427,685	7,780,718	10,180,119	13,980,567
Glenn	14,875	65,305	54,400	1,464,906	1,599,486	1,810,143
Humboldt	102,655	211,605	62,381	1,643,323	2,019,964	2,794,744
Imperial	231,286	293,525	4,672	2,794,584	3,324,067	4,616,458
Inyo	------------	69,040	------------	3,293,453	3,362,493	4,556,758
Kern	------------	766,805	------------	8,460,044	9,226,849	15,780,279
Kings	38,355	82,020	99,344	2,089,621	2,309,340	2,756,370
Lake	------------	------------	------------	------------	------------	19,820
Lassen	5,590	80,710	------------	2,697,635	2,783,935	2,876,560
Los Angeles	1,498,920	411,040	5,113,037	5,864,294	12,887,291	193,491,046
Madera	73,854	97,805	43,164	1,777,993	1,992,816	2,414,587
Marin	277,130	265,060	189,189	1,034,670	1,766,049	1,896,509
Mariposa	------------	10,520	------------	388,116	398,636	410,663
Mendocino	73,425	259,895	34,125	1,541,904	1,909,349	2,259,686
Merced	68,710	33,345	144,113	3,270,936	3,517,104	3,785,554
Modoc	------------	2,625	3,400	228,582	234,607	308,230
Mono	------------	------------	------------	702,555	702,555	710,375
Monterey	57,625	168,675	212,376	3,473,892	3,911,568	4,413,646
Napa	86,875	26,460	164,555	1,612,874	1,890,764	2,309,412
Nevada	13,255	86,095	8,624	808,443	916,417	1,769,042
Orange	161,035	277,480	746,250	2,548,995	3,733,760	7,816,800
Placer	51,460	473,221	166,850	2,392,155	3,083,686	3,814,336
Plumas	------------	30,505	------------	2,128,302	2,158,807	3,704,068
Riverside	158,000	281,460	862,971	4,725,961	6,028,392	7,442,792
Sacramento	2,637,149	160,970	555,511	3,318,559	6,672,189	10,382,610
San Benito	18,455	21,844	19,800	482,969	543,068	949,869
San Bernardino	1,288,110	864,375	911,360	16,671,574	19,735,419	24,284,764
San Diego	989,695	189,600	685,056	1,798,288	3,662,639	7,100,914
San Francisco	6,668,709	------------	346,458	------------	7,015,167	213,666,376
San Joaquin	776,162	345,210	602,068	5,120,354	6,843,794	9,958,861
San Luis Obispo	157,450	86,067	158,537	1,945,681	2,347,735	2,860,804
San Mateo	89,875	571,324	333,344	725,566	1,720,109	2,183,445
Santa Barbara	32,949	165,822	242,612	3,213,808	3,655,191	5,285,680
Santa Clara	543,212	841,917	379,074	2,159,986	3,924,189	8,980,890
Santa Cruz	153,935	133,365	133,728	1,157,080	1,578,108	2,391,173
Shasta	11,675	186,409	49,922	1,697,762	1,945,768	2,839,084
Sierra	21,630	3,500	21,200	67,836	114,166	149,796
Siskiyou	2,500	350,236	112,924	3,170,374	3,636,034	4,214,058
Solano	73,300	1,123,255	120,935	2,203,991	3,521,481	3,424,908
Sonoma	62,920	88,620	93,840	2,706,980	2,952,360	4,363,425
Stanislaus	64,780	265,325	125,892	2,752,631	3,208,628	4,719,398
Sutter	15,824	53,495	37,193	1,558,629	1,665,141	1,889,713
Tehama	205,170	189,190	86,555	1,267,907	1,748,822	2,017,247
Trinity	------------	2,375	------------	168,441	170,816	223,559
Tulare	248,320	543,240	340,080	5,772,113	6,903,753	8,254,853
Tuolumne	4,275	66,419	------------	458,737	529,431	1,584,560
Ventura	23,770	219,845	228,515	2,676,569	3,148,699	3,759,162
Yolo	49,985	101,720	51,620	2,598,374	2,801,699	3,336,309
Yuba	54,744	20,096	180,467	1,127,950	1,382,257	2,148,472
Totals	$27,858,394	$15,070,619	$16,867,550	$140,139,040	$199,935,603	$660,346,732

SCHEDULE 7.

Summary of Assessed Values of Non-operative Property as Reported by County Auditors to the State Tax Commission for 1915.

County	Total land inside and outside	Total improvements inside and outside	Total personal property inside and outside	Total money and credits inside and outside	Total nonoperative	Grand total taxable property
Alameda	$148,049,236	$64,140,575	$20,659,891	$1,932,200	$234,781,902	$262,482,711
Alpine	467,868	108,200	76,414	--------------	652,482	780,232
Amador	3,579,843	1,655,967	691,693	500	5,928,003	6,739,328
Butte	11,756,530	4,914,890	3,261,380	61,920	19,994,720	24,942,771
Calaveras	4,494,300	1,724,740	843,975	14,160	7,077,175	7,983,665
Colusa	11,402,280	1,514,805	1,703,186	15,280	14,635,551	15,875,759
Contra Costa	27,150,705	12,861,850	7,559,077	633,130	48,204,762	54,517,388
Del Norte	4,523,337	244,265	293,000	--------------	5,060,602	5,077,652
El Dorado	3,933,890	1,169,440	866,655	2,175	5,972,160	7,083,583
Fresno	52,228,815	19,195,700	12,345,813	326,248	84,096,576	97,816,687
Glenn	12,404,679	1,359,564	1,888,566	6,365	15,659,174	17,472,421
Humboldt	24,582,255	4,238,905	3,033,273	91,179	31,945,612	34,742,783
Imperial	18,015,978	2,782,744	3,904,637	--------------	24,703,359	29,121,521
Inyo	5,300,870	1,183,640	1,134,930	9,352	7,628,792	12,129,273
Kern	46,412,744	11,934,446	15,069,865	6,675	73,423,730	88,848,987
Kings	9,801,335	2,308,480	2,847,410	21,123	14,978,348	17,682,680
Lake	3,401,755	924,440	633,455	29,470	4,989,120	5,008,715
Lassen	5,011,835	834,688	1,738,295	26,003	7,610,821	10,390,566
Los Angeles	440,392,010	175,458,770	80,361,665	11,623,915	707,836,360	862,454,940
Madera	10,942,480	1,198,505	1,526,125	2,775	13,669,885	16,046,609
Marin	13,668,445	6,176,455	1,557,375	3,515	21,405,790	23,451,631
Mariposa	2,205,894	514,467	576,461	1,300	3,298,122	3,681,289
Mendocino	11,381,686	2,285,575	2,286,003	47,684	16,000,948	18,316,810
Merced	16,254,260	3,075,780	3,468,805	--------------	22,798,845	26,544,868
Modoc	4,922,230	1,007,763	1,714,205	104,850	7,749,048	8,068,496
Mono	637,775	171,945	327,980	1,600	1,139,300	1,911,817
Monterey	20,868,985	4,867,963	4,453,641	2,430	30,193,019	34,589,859
Napa	8,244,365	5,498,580	2,612,685	52,775	16,408,405	18,690,073
Nevada	3,155,160	2,537,190	926,140	14,965	6,633,455	8,347,631
Orange	29,900,655	8,952,800	9,323,670	71,550	48,248,675	55,266,008
Placer	7,434,205	2,854,510	863,136	12,050	11,163,901	14,966,268
Plumas	5,134,001	722,200	1,031,929	23,212	6,911,342	10,456,790
Riverside	18,287,030	7,314,030	2,428,735	--------------	28,029,795	35,189,142
Sacramento	55,683,194	20,442,270	8,610,020	343,000	85,078,484	96,406,835
San Benito	5,477,290	1,563,465	1,350,270	--------------	8,391,025	9,270,826
San Bernardino	26,388,815	13,456,560	2,816,423	18,665	42,680,463	66,239,493
San Diego	52,154,249	11,208,925	6,443,948	221,075	70,028,197	76,832,627
San Francisco	304,288,151	172,526,327	45,942,943	15,935,329	538,692,750	656,196,951
San Joaquin	36,849,567	14,267,327	7,383,640	184,724	58,685,258	68,421,947
San Luis Obispo	9,941,523	3,529,985	5,419,235	5,794	18,896,537	21,757,279
San Mateo	22,452,855	9,004,155	2,032,715	346,250	33,835,975	35,986,969
Santa Barbara	16,690,755	7,634,325	5,449,145	11,100	29,785,325	35,062,318
Santa Clara	47,069,770	23,354,440	6,734,450	689,590	77,848,250	86,666,646
Santa Cruz	11,049,150	5,544,605	2,002,405	10,755	18,606,915	20,836,388
Shasta	8,552,365	2,527,880	1,358,850	--------------	12,439,095	15,281,006
Sierra	1,640,620	460,255	227,620	1,510	2,330,005	2,516,471
Siskiyou	11,806,140	2,401,620	2,967,925	117,705	17,293,390	21,346,033
Solano	14,667,629	5,902,480	2,693,217	20,715	23,284,041	26,761,656
Sonoma	21,092,240	10,878,770	5,166,005	157,215	37,294,230	41,701,104
Stanislaus	18,782,530	5,953,395	4,297,775	121,900	29,155,600	33,193,980
Sutter	8,995,540	1,234,260	1,180,685	51,810	11,462,295	13,358,785
Tehama	9,090,310	2,438,950	2,396,345	110,165	14,035,770	16,039,723
Trinity	2,467,355	266,965	439,325	6,900	3,180,545	3,400,979
Tulare	30,186,760	9,182,425	5,190,455	46,540	44,606,180	52,682,367
Tuolumne	4,920,831	2,207,335	878,530	3,901	8,010,597	9,559,478
Ventura	21,897,195	3,360,180	3,145,499	10,687	28,413,561	32,159,977
Yolo	15,585,515	3,366,835	2,611,930	33,400	21,597,680	24,955,896
Yuba	4,582,145	1,837,030	1,966,795	7,830	8,393,800	10,515,907
Totals	$1,748,259,930	$690,284,636	$320,716,220	$33,594,961	$2,792,855,747	$3,313,830,594

SCHEDULE 8.

Summary of Assessed Values of Non-operative Property as Obtained from County Auditors by the State Tax Commission for 1916.

County	Total land inside and outside	Total improvements inside and outside	Total personal property inside and outside	Total money and credits inside and outside	Total nonoperative	Grand total taxable property
Alameda	$147,548,091	$65,674,700	$20,576,911	$1,650,530	$235,450,232	$262,692,661
Alpine	467,373	108,555	69,344	--------------	645,272	764,822
Amador	3,725,728	1,674,920	752,593	--------------	6,153,241	6,971,016
Butte	12,119,805	4,911,230	3,142,345	32,260	20,205,640	25,841,586
Calaveras	4,601,945	1,704,025	986,670	12,420	7,305,060	8,216,856
Colusa	11,420,225	1,606,865	1,755,080	34,470	14,816,640	16,242,337
Contra Costa	26,413,385	14,672,295	8,661,836	2,089,245	51,836,761	58,226,178
Del Norte	4,469,250	266,855	252,365	250	4,988,660	5,023,710
El Dorado	5,005,645	1,101,955	900,630	600	7,008,830	8,069,518
Fresno	53,241,430	19,186,373	12,933,085	290,132	85,651,020	99,631,587
Glenn	11,729,959	2,190,465	2,740,517	14,350	16,675,291	18,485,434
Humboldt	24,399,750	4,260,470	2,988,492	61,123	31,709,835	34,504,579
Imperial	19,168,333	2,984,646	3,974,228	--------------	26,127,207	30,744,665
Inyo	5,418,561	1,200,140	1,227,081	11,788	7,857,570	12,414,328
Kern	46,501,038	12,319,514	16,527,603	4,280	75,352,435	91,132,714
Kings	10,445,970	2,309,705	2,916,040	13,445	15,685,160	18,441,530
Lake	3,404,735	928,690	585,925	15,650	4,935,000	4,954,820
Lassen	5,020,531	841,353	1,811,957	28,127	7,701,968	10,578,528
Los Angeles	533,613,900	169,883,780	81,042,113	13,346,428	797,886,221	991,377,277
Madera	11,395,370	1,106,400	1,626,659	78	14,128,507	16,543,094
Marin	13,882,040	6,223,910	1,807,455	14,045	21,927,450	23,823,959
Mariposa	2,261,113	501,766	620,104	1,455	3,384,438	3,795,101
Mendocino	11,581,680	2,322,165	2,445,578	71,373	16,420,796	18,681,482
Merced	16,335,825	2,858,830	3,940,235	--------------	23,134,890	26,920,444
Modoc	4,936,700	1,030,240	1,751,246	128,915	7,847,101	8,155,331
Mono	1,367,335	265,185	417,950	--------------	2,050,470	2,760,845
Monterey	21,610,991	5,026,180	4,494,188	500	31,131,859	35,545,505
Napa	9,060,920	5,659,200	2,649,510	47,055	17,416,685	19,726,097
Nevada	3,297,425	2,524,495	933,835	22,430	6,778,185	8,547,227
Orange	30,254,450	9,566,090	9,704,475	61,775	49,586,790	57,403,590
Placer	6,239,460	2,752,215	927,729	18,050	9,937,454	13,751,790
Plumas	5,368,396	746,575	1,077,060	24,571	7,216,602	10,920,670
Riverside	18,616,323	7,938,480	2,569,790	--------------	29,124,593	36,567,385
Sacramento	55,872,776	19,833,270	8,658,790	615,560	84,980,396	94,863,006
San Benito	6,020,085	1,591,170	1,520,120	--------------	9,131,375	10,081,244
San Bernardino	26,714,960	13,706,155	3,226,235	26,015	43,673,365	67,958,129
San Diego	53,372,982	11,443,900	6,666,646	977,384	72,460,912	79,561,826
San Francisco	302,575,489	175,387,605	40,861,429	23,738,533	542,563,056	756,229,432
San Joaquin	37,340,326	15,083,132	7,743,987	257,141	60,424,586	70,383,447
San Luis Obispo	9,867,963	3,715,001	5,586,715	1,100	19,170,779	22,035,583
San Mateo	22,107,385	9,656,880	2,068,220	290,950	34,123,435	36,306,870
Santa Barbara	17,436,430	7,970,960	5,799,050	10,200	31,216,640	36,502,320
Santa Clara	47,187,880	23,708,890	6,700,865	671,835	78,269,470	87,629,434
Santa Cruz	11,016,755	5,527,385	1,882,550	7,800	18,434,490	20,825,663
Shasta	10,149,795	2,546,205	1,656,430	--------------	14,352,430	17,191,514
Sierra	1,652,100	439,715	200,630	1,785	2,294,230	2,444,026
Siskiyou	11,889,060	2,276,090	3,093,740	54,345	17,313,235	21,527,293
Solano	14,774,120	6,055,255	2,895,916	18,592	23,743,883	27,168,791
Sonoma	21,121,090	10,879,510	4,701,315	145,945	36,847,860	41,283,398
Stanislaus	18,777,530	6,320,305	4,423,340	135,920	29,657,095	34,376,493
Sutter	8,976,735	1,292,200	1,289,580	23,850	11,582,365	13,472,178
Tehama	9,093,415	2,397,175	2,313,140	76,000	13,879,730	15,896,977
Trinity	2,490,005	307,300	403,000	8,115	3,208,420	3,431,979
Tulare	29,951,615	9,695,320	5,382,815	40,130	45,069,880	53,324,733
Tuolumne	4,803,687	2,101,740	1,000,803	3,116	7,909,346	9,493,906
Ventura	21,961,150	3,536,030	3,375,910	10,565	28,883,655	32,642,817
Yolo	15,479,940	3,533,230	2,480,005	22,300	21,515,475	24,851,784
Yuba	4,517,130	1,856,660	2,156,955	8,635	8,539,380	10,687,852
Totals	$1,850,074,085	$697,209,350	$324,898,755	$45,141,161	$2,917,323,351	$3,577,627,361

SCHEDULE 9.

Showing Amount of Tax Levies in 1915 for Certain Purposes.

County	General county levy					Special county levy				Grand total general and special tax
	Common school tax	High school tax	Road tax	Other taxes	Total general taxes	Common school tax	High school tax	Other taxes	Total special taxes	
Alameda	$633,911 14	$328,694 66	$97,825 45	$1,361,735 03	$2,422,166 28	$851,646 67	$274,258 69	$82,579 11	$1,208,484 47	$3,630,650 75
Alpine	521 98	---	652 48	7,634 04	8,808 50	---	---	---	---	8,808 50
Amador	21,350 35	11,861 28	19,524 09	61,678 74	114,414 46	5,691 12	10,962 87	1,324 79	17,978 78	132,393 24
Butte	79,978 88	44,988 12	61,599 40	464,313 70	650,880 10	59,719 53	13,188 76	---	72,908 29	723,788 39
Calaveras	28,524 29	7,131 07	---	84,656 60	120,311 96	176 10	4,070 28	1,485 87	5,732 25	126,044 21
Colusa	24,880 44	14,635 55	54,623 44	165,381 73	259,521 16	10,246 30	22,072 47	2,876 26	35,195 03	295,716 19
Contra Costa	149,434 76	48,204 76	110,538 89	549,534 27	857,712 68	103,878 90	80,480 48	33,765 86	218,125 24	1,075,837 92
Del Norte	12,651 42	9,615 11	18,810 34	63,763 49	104,840 36	2,879 05	---	---	2,879 05	107,719 41
El Dorado	16,722 04	10,749 89	20,742 40	91,971 25	140,185 58	1,693 95	---	677 43	2,371 38	142,556 96
Fresno	269,109 95	126,145 29	228,746 30	681,184 57	1,305,186 11	420,662 83	---	265 02	420,927 85	1,726,113 96
Glenn	36,067 49	---	55,616 65	225,029 75	316,713 89	14,393 73	19,814 74	112,672 04	146,880 51	463,594 40
Humboldt	115,802 84	38,334 73	119,042 97	420,883 44	694,063 98	39,099 78	7,578 38	1,288 66	47,966 82	742,030 80
Imperial	76,580 41	37,055 04	113,256 79	229,741 22	456,633 46	91,563 20	92,822 16	7,443 34	191,828 70	648,462 16
Inyo	15,257 58	7,628 29	20,420 78	76,287 93	119,594 58	10,111 15	1,546 98	1,325 76	12,983 89	132,578 47
Kern	121,149 15	102,793 22	223,555 95	551,483 98	998,982 30	139,208 60	15,494 65	18,381 27	173,084 52	1,172,066 87
Kings	67,402 57	19,471 85	74,310 96	212,692 53	373,877 91	46,866 03	46,921 66	---	93,787 69	467,665 60
Lake	12,971 71	8,232 05	26,449 99	53,633 00	101,286 75	3,432 92	3,611 35	720 13	7,764 40	109,051 15
Lassen	24,323 85	---	30,404 82	85,133 47	139,862 14	4,898 80	11,560 62	1,619 57	18,078 99	157,941 13
Los Angeles	1,203,300 00	1,026,344 00	598,308 00	4,453,890 00	7,281,842 00	2,698,222 16	2,040,353 85	645,046 46	5,383,622 47	12,665,464 47
Madera	47,844 60	8,201 93	50,140 40	144,900 78	251,087 71	25,452 86	18,686 99	---	44,139 85	295,227 56
Marin	53,515 22	23,546 69	41,382 60	211,920 26	330,364 77	65,254 46	25,726 97	40,284 43	131,265 86	461,630 63
Mariposa	10,883 80	4,287 56	13,192 49	34,300 47	62,664 32	626 85	32 92	---	659 77	63,324 09
Mendocino	51,127 86	27,161 67	76,518 69	209,748 35	364,556 57	11,307 27	14,249 97	---	25,557 24	390,113 81
Merced	56,997 11	---	123,868 50	262,185 70	443,051 31	36,540 43	73,353 64	---	109,894 07	552,945 38
Modoc	23,247 14	7,749 05	29,322 81	77,490 47	137,809 47	6,626 31	8,117 48	405 69	15,149 48	152,958 95
Mono	4,556 72	227 84	---	23,820 25	28,604 81	---	---	---	---	28,604 81
Monterey	87,559 75	30,193 01	93,334 74	369,316 30	580,403 80	28,779 16	40,159 25	---	68,938 41	649,342 21
Napa	41,021 01	---	41,417 88	201,823 37	284,262 26	20,250 43	39,511 87	---	59,762 30	344,024 56
Nevada	33,167 27	19,900 36	23,037 10	92,868 37	168,973 10	510 06	3,616 97	4,178 68	8,305 71	177,278 81
Orange	120,621 69	96,497 35	130,307 30	530,735 41	878,161 75	134,258 52	196,355 33	92,444 85	423,058 70	1,301,220 45

Placer	36,046 77	19,661 87	33,386 46	146,371 72	235,466 82	15,636 13	29,600 51	1,457 62	46,694 26	282,161 68
Plumas	16,595 76	--------------	37,838 34	78,265 61	132,699 71	4,083 13	11,294 55	--------------	15,377 68	148,077 39
Riverside	89,695 34	81,286 40	85,481 46	372,796 28	629,259 48	112,856 26	85,859 80	100,270 43	298,986 49	928,245 97
Sacramento	170,156 00	88,481 00	127,995 55	853,424 00	1,240,056 55	247,733 00	68,690 00	162,979 00	479,402 00	1,719,458 55
San Benito	20,977 56	12,586 54	17,285 41	146,842 93	197,692 44	4,546 27	--------------	--------------	4,546 27	202,238 71
San Bernardino	136,577 48	95,604 23	67,682 15	521,494 55	821,358 41	101,813 78	87,804 12	25,838 38	215,456 28	1,036,814 69
San Diego	148,716 22	126,143 65	66,838 53	848,272 95	1,189,971 35	295,177 14	152,859 37	74,382 52	522,419 03	1,712,390 38
San Francisco	1,373,694 56	--------------	--------------	10,801,010 19	12,174,704 75	--------------	--------------	--------------	--------------	12,174,704 75
San Joaquin	117,370 51	52,816 73	133,408 24	710,091 62	1,013,687 10	169,360 81	77,358 15	2,429 75	249,148 71	1,262,835 81
San Luis Obispo	44,222 45	15,920 08	106,133 89	222,273 42	388,549 84	16,553 42	7,073 75	1,942 59	25,569 76	414,119 60
San Mateo	101,507 92	23,685 18	109,102 90	460,169 26	694,465 26	49,152 43	44,939 36	46,343 72	140,435 52	834,900 78
Santa Barbara	89,355 97	--------------	95,028 14	402,102 47	586,486 58	55,009 52	97,291 08	34,325 54	186,626 14	773,112 72
Santa Clara	194,620 62	124,557 20	166,079 54	670,014 08	1,155,271 44	86,253 53	111,560 37	12,931 69	210,745 59	1,366,017 03
Santa Cruz	70,706 27	36,283 48	53,312 94	209,327 78	369,630 47	56,974 11	15,243 35	1,955 42	74,172 88	443,803 35
Shasta	39,000 00	15,660 00	42,756 88	199,200 00	296,616 88	12,674 00	--------------	787 91	13,461 91	310,078 79
Sierra	7,223 02	--------------	9,981 90	33,552 07	50,756 99	1,370 51	1,737 74	--------------	3,108 25	53,865 24
Siskiyou	43,233 84	--------------	69,173 56	226,167 36	338,574 76	14,907 68	44,350 48	2,354 86	61,613 02	400,187 78
Solano	60,554 69	32,599 91	65,558 31	272,442 10	431,155 01	44,258 95	57,718 98	11,931 03	113,908 96	545,063 97
Sonoma	102,186 19	59,297 83	49,176 92	435,223 66	645,884 60	146,594 89	--------------	42,175 88	188,770 77	834,655 37
Stanislaus	87,466 80	58,311 20	91,736 02	319,253 82	556,767 84	97,552 46	86,667 99	--------------	184,220 39	740,988 23
Sutter	35,533 11	--------------	43,727 56	165,057 04	244,317 71	22,580 50	12,660 08	645 80	35,886 38	280,204 09
Tehama	49,125 19	21,053 65	46,218 56	294,748 96	411,146 36	11,103 61	22,181 18	--------------	33,284 79	444,431 15
Trinity	10,177 74	4,770 82	17,492 90	47,072 06	79,513 52	--------------	--------------	123 65	123 65	79,637 17
Tulare	160,582 20	89,212 30	223,388 20	508,510 18	981,692 88	122,553 98	71,416 66	638 34	194,608 98	1,176,301 86
Tuolumne	20,026 43	--------------	27,848 30	112,948 65	160,823 38	--------------	23,474 46	9,398 82	32,873 28	193,696 66
Ventura	56,827 13	31,254 93	70,797 86	436,365 23	595,245 15	45,582 31	47,323 19	13,693 17	106,598 67	701,843 82
Yolo	49,674 00	22,072 00	112,176 00	209,029 00	392,951 00	24,539 17	33,011 12	1,147 17	58,697 46	451,648 46
Yuba	25,178 40	4,196 40	21,756 40	197,230 80	248,362 00	8,960 68	17,113 09	--------------	26,073 77	274,435 77
Totals	$6,797,515 19	$3,075,105 77	$4,488,315 13	$31,898,996 26	$46,259,932 35	$6,601,925 38	$4,271,778 71	$1,696,538 51	$12,470,142 61	$58,730,074 96

SCHEDULE 10.

Showing Amount of Tax Levies in 1916 for Certain Purposes.

County	General county levy					Special county levy				Grand total general and special tax
	Common school tax	High school tax	Road tax	Other taxes	Total general taxes	Common school tax	High school tax	Other taxes	Total special taxes	
Alameda	$635,715 63	$376,720 37	$99,297 36	$1,389,156 36	$2,500,889 72	$768,614 73	$344,378 93	$102,345 65	$1,215,339 31	$3,716,229 03
Alpine	2,645 27	----	645 27	7,420 62	8,711 16	None	None	None	----	8,711 16
Amador	26,458 93	12,306 48	15,986 21	59,686 41	114,438 03	6,236 79	13,361 82	1,009 23	20,607 84	135,045 87
Butte	76,781 55	48,493 54	62,204 20	359,660 39	547,139 68	45,189 48	20,820 90	9,236 46	75,246 84	622,386 52
Calaveras	30,681 25	8,035 56	27,069 42	81,816 66	147,602 89	143 32	4,149 92	11,675 04	15,978 28	163,581 17
Colusa	29,633 28	13,334 98	75,938 59	157,056 38	275,963 23	6,843 21	22,464 48	1,994 82	31,302 51	307,265 74
Contra Costa	160,693 00	49,244 00	122,529 00	593,529 00	925,995 00	122,241 16	73,219 08	5,090 40	200,550 64	1,126,545 64
Del Norte	13,469 38	9,478 45	27,548 97	41,904 73	92,401 53	849 26	----	----	849 26	93,250 79
El Dorado	13,316 00	11,915 00	23,349 00	93,915 00	142,495 00	2,946 86	----	----	2,946 86	145,441 86
Fresno	274,083 26	128,476 53	232,561 75	676,643 05	1,311,764 59	258,966 71	163,921 35	13,126 59	436,014 65	1,747,779 24
Glenn	36,685 64	13,340 23	59,393 51	165,085 37	274,504 75	32,996 00	20,661 24	1,564 27	55,221 51	329,726 26
Humboldt	112,569 91	40,430 04	118,152 76	446,255 18	717,407 89	18,324 06	39,086 92	1,856 82	59,267 80	776,675 69
Imperial	73,156 18	41,803 53	115,400 62	271,722 93	502,083 26	101,707 90	108,334 29	6,128 42	216,170 61	718,253 87
Inyo	15,715 00	12,572 00	21,093 21	73,859 00	123,239 21	12,205 42	10,941 43	1,673 75	24,820 60	148,059 81
Kern	124,331 00	----	230,198 00	532,603 00	887,132 00	259,554 39	132,329 83	31,222 55	423,106 77	1,310,238 77
Kings	69,014 70	20,390 70	78,498 39	192,927 48	360,831 27	32,917 16	36,485 07	----	69,402 23	430,233 50
Lake	13,818 00	10,857 00	21,845 98	53,791 00	100,311 98	1,494 31	5,237 30	----	6,731 61	107,043 59
Lassen	30,807 37	6,161 57	28,970 96	86,262 03	152,201 93	5,108 62	12,848 47	1,791 14	19,748 23	171,950 16
Los Angeles	1,196,831 00	1,117,042 00	580,636 50	4,148,250 73	7,042,760 23	2,956,126 85	2,224,823 79	707,609 42	5,888,560 06	12,931,320 29
Madera	49,449 77	9,466 10	51,676 00	153,011 73	263,603 60	26,272 29	17,547 59	211 92	44,031 80	307,635 40
Marin	54,818 00	24,120 00	35,874 41	257,644 00	372,456 41	68,331 85	23,342 98	51,623 58	143,298 41	515,754 82
Mariposa	11,845 53	3,045 99	13,537 75	35,875 04	64,304 31	1,091 38	----	----	1,091 38	65,395 69
Mendocino	52,546 00	30,378 00	79,123 77	204,436 00	366,483 77	11,446 91	49,124 73	----	60,571 64	427,055 41
Merced	57,837 23	----	124,245 75	266,051 22	448,134 21	41,518 72	77,881 13	1,414 21	120,814 06	568,948 27
Modoc	23,541 30	8,631 81	29,701 24	69,839 19	131,713 54	6,797 71	12,361 46	612 50	19,771 67	151,485 21
Mono	8,201 93	410 10	8,201 93	24,195 44	41,009 40	----	----	230 07	230 07	41,239 47
Monterey	84,056 00	----	96,734 90	351,786 00	532,576 90	23,102 76	67,393 37	9,908 22	100,404 35	632,981 25
Napa	45,283 38	24,383 35	40,861 78	196,808 52	307,337 03	14,984 07	23,058 36	1,203 13	39,245 56	346,582 59
Nevada	33,890 92	----	23,599 12	94,894 59	152,384 63	2,382 82	26,040 33	2,456 47	30,879 62	183,264 25
Orange	123,966 00	119,008 00	137,614 10	525,616 00	906,204 10	168,809 54	182,687 38	43,327 30	394,824 22	1,301,028 32

Placer	39,749 00	19,874 00	28,663 94	163,966 00	252,252 94	28,232 65	36,143 39	888 42	65,264 46	317,517 40
Plumas	12,268 22	--------	32,474 71	88,764 19	133,507 12	3,971 96	1,081 96	--------	5,053 92	138,561 04
Riverside	84,461 32	87,373 78	89,371 28	401,919 38	663,125 76	126,652 06	95,380 82	36,748 02	258,780 90	921,906 66
Sacramento	204,802 00	90,928 00	156,556 00	878,307 00	1,330,593 00	290,282 25	102,879 12	34,642 00	427,803 37	1,758,396 37
San Benito	21,915 00	17,349 00	18,882 00	157,058 00	215,204 00	4,290 00	--------	--------	4,290 00	219,494 00
San Bernardino	135,387 43	113,550 75	81,719 52	695,011 20	1,025,668 90	162,168 57	161,082 28	29,738 82	352,989 67	1,378,658 57
San Diego	159,414 00	152,167 00	74,873 64	968,955 94	1,355,410 58	291,666 51	209,651 64	51,728 66	553,046 81	1,908,457 39
San Francisco	1,464,920 00	--------	--------	11,176,797 00	12,641,717 00	None	None	None	None	12,641,717 00
San Joaquin	120,849 17	57,403 36	135,933 00	728,116 26	1,042,301 79	44,097 89	284,662 24	1,906 37	330,666 50	1,372,968 29
San Luis Obispo	47,926 00	21,087 00	62,729 00	254,970 00	386,712 00	26,504 14	10,055 48	4,546 08	41,105 70	427,817 70
San Mateo	98,957 00	23,886 00	83,694 72	498,199 00	704,736 72	77,574 13	66,934 65	67,870 01	212,378 79	917,115 51
Santa Barbara	93,649 00	--------	107,291 00	408,934 00	609,874 00	67,142 48	95,634 55	54,351 74	217,128 77	827,002 77
Santa Clara	203,500 00	146,363 00	167,324 94	832,540 25	1,349,728 19	172,586 91	138,167 54	29,173 81	339,928 26	1,689,656 45
Santa Cruz	70,972 00	35,947 00	52,401 40	209,085 11	368,405 51	47,118 93	46,597 09	1,419 89	95,135 91	463,541 42
Shasta	53,103 99	18,227 58	50,097 68	205,670 31	327,099 56	3,249 83	30,089 29	759 52	34,098 64	361,198 20
Sierra	9,176 92	--------	10,054 60	30,972 10	50,203 62	1,234 19	2,539 60	--------	3,773 79	53,977 41
Siskiyou	43,283 08	--------	60,626 76	209,490 13	313,399 97	19,116 86	56,007 00	1,547 84	76,671 70	390,071 67
Solano	61,734 00	35,615 00	66,567 00	275,425 00	439,341 00	26,184 68	54,230 15	1,169 79	81,584 62	520,925 62
Sonoma	95,804 00	63,009 00	101,619 06	357,052 00	617,484 06	63,459 77	70,202 33	40,967 51	174,629 61	792,113 67
Stanislaus	88,971 29	59,314 19	93,383 00	326,228 04	567,896 52	95,299 61	72,344 99	10,697 21	178,341 81	746,238 33
Sutter	23,164 73	11,582 36	44,209 62	104,241 27	183,197 98	11,108 22	9,685 83	621 52	21,415 57	204,613 55
Tehama	48,579 05	20,819 59	45,576 04	262,969 14	377,943 82	15,014 84	37,641 48	--------	52,656 32	430,600 14
Trinity	8,983 57	4,812 63	19,250 52	47,163 75	80,210 47	702 06	651 48	--------	1,353 54	81,564 01
Tulare	162,251 64	90,139 80	225,801 00	468,254 46	946,446 90	125,103 51	99,520 82	6,426 20	231,050 53	1,177,497 43
Tuolumne	19,773 36	--------	32,226 35	111,521 78	163,521 49	6,561 23	22,750 70	1,722 00	31,033 93	194,555 42
Ventura	66,432 00	37,548 00	65,150 37	421,699 00	590,829 37	48,084 88	75,508 20	14,938 28	138,531 36	729,360 73
Yolo	49,915 90	22,397 60	112,061 10	207,387 63	391,762 23	26,083 65	14,275 43	5,006 84	45,365 92	437,128 15
Yuba	25,618 14	8,539 38	22,360 32	136,630 08	193,147 92	34,886 63	13,236 47	--------	48,123 10	241,271 02
Totals	$6,995,404 22	$3,277,979 35	$4,623,389 02	$32,239,031 08	$47,135,803 67	$6,815,592 72	$5,519,456 68	$1,404,182 49	$13,739,231 89	$60,875,035 56

SCHEDULE 11.

Municipal Taxes and Assessments.

Municipality	Total municipal taxes, 1912	Total municipal taxes, 1916	Total nonoperative assessment (city roll) 1912	Total nonoperative assessment (city roll) 1916	Tax rate, 1912		Tax rate, 1916	
Alameda	$205,196 58	$256,089 30	$18,825,375 00	$19,979,100 00		$1.09		$1.30
Albany	14,699 25	23,781 75	1,959,900 00	3,170,900 00		.75		.75
Alhambra	75,789 16	95,030 57	6,901,945 00	9,249,437 00	$1.00	1.15	$1.00	1.07
Alturas	7,166 58	8,219 10	409,513 00	469,663 00		1.75		1.75
Alviso	828 22	835 34	207,055 00	225,920 00		.40		.10
Anaheim	25,278 38	31,378 65	1,486,950 00	2,164,045 00		1.70		1.45
Angels	1,883 85	1,880 57	627,955 00	537,305 00		.30		.35
Antioch	6,470 81	12,470 31	517,665 00	825,615 00		1.25		1.5086
Arcadia	8,294 90	31,737 80	2,073,723 00	3,180,070 00		.40		1.00
Arcata	8,574 90	11,060 88	884,011 00	921,740 00		.97		1.20
Arroyo Grande	1,811 68	2,784 21	201,947 00	371,228 00		.60		.75
Auburn	9,960 00	13,545 53	996,000 00	1,354,553 00		1.00		1.00
Avalon		9,320 17		932,017 00				1.00
Azusa	15,060 84	32,707 26	1,004,056 00	1,635,363 00		1.50		2.00
Bakersfield	117,136 68	169,159 95	6,886,790 00	13,109,020 00	1.70	1.71	1.24	1.30
Banning		6,391 01	555,740 00	555,740 00				1.15
Belvedere	10,734 88	12,258 83	740,337 00	761,418 00		1.45		1.61
Beaumont		3,542 00	288,010 00	288,010 00				1.23
Benicia	12,415 18	11,616 00	775,949 00	774,610 00		1.60		1.50
Berkeley	388,441 79	640,398 90	38,917,900 00	41,881,094 00	.91	.97		1.43
Beverley Hills		36,251 52	3,661,770 00	3,661,770 00				1.00
Biggs	2,178 56	3,383 05	189,440 00	254,365 00		1.15		1.33
Bishop	9,693 68	13,061 67	668,530 00	900,805 00		1.45		1.45
Blue Lake	1,250 78	1,073 20	102,150 00	107,320 00		1.25		1.45
Boulder Creek	1,454 30		171,095 00			.85		
Brawley	11,523 75	28,305 37	876,932 00	1,572,520 00		1.30		1.80
Burbank	6,809 89	23,454 01	680,989 00	2,329,870 00		1.00		1.006
Burlingame	21,766 95	42,939 74	2,476,695 00	3,023,925 00		1.00		1.42
Calexico	15,562 82	22,952 65	778,141 00	2,295,265 00		2.00		1.00
Calistoga	3,653 74	5,385 19	486,975 00	598,355 00		.75		.90
Chico	43,607 78	42,919 55	2,812,155 00	2,877,354 50	1.45	1.55	1.40	1.50
Chino	8,103 69	20,667 75	900,410 00	1,215,750 00		.90		1.70

Chula Vista	12,711 15	12,619 76	1,271,115 00	1,328,028 00	1.00	.95
Claremont	11,769 10	17,900 04	1,279,250 00	1,556,525 00	.92	1.15
Cloverdale	4,544 07	5,773 64	504,897 00		.90	1.00
Clovis	3,149 14	8,000 00	349,904 00	457,065 00	.90	1.76
Coalinga	16,251 00	14,663 37	1,300,080 00	1,078,189 00	1.25	1.36
Colfax	1,588 31	2,693 16	127,065 00	185,735 00	1.25	1.45
Colton	24,178 35	3,750 51	1,272,542 00	1,373,275 00	1.90	.26
Colusa	19,535 79	15,323 02	1,220,987 00	1,222,219 00	1.60	1.25
Compton	9,414 66	14,415 92	724,205 00	900,995 00	1.30	1.60
Concord	4,063 41	6,379 37	232,195 00	375,257 00	1.75	1.70
Corcoran		4,409 43	440,943 00			1.00
Coram						
Corning	8,874 64	12,258 83	554,665 00	681,046 00	1.60	1.80
Corona	42,073 08	56,935 08	1,938,850 00	4,349,085 00	2.17	1.32
Coronado	53,105 33	64,963 11	2,765,903 00	3,474,041 00	1.92	1.87
Covina	9,040 00	15,399 64	992,450 00		.98	
Crescent City	3,750 00	3,022 00	500,000 00	403,050 00	.75	.75
Daly City	7,781 96	25,101 84	778,196 00	1,554,840 00	1.00	1.62
Delano		2,084 77		217,763 00		1.00
Dinuba	5,399 80	9,973 20	431,984 00	595,415 00	1.25	1.675
Dixon	6,968 41	10,446 00	516,179 00	696,400 00	1.35	1.50
Dorris	1,666 37		133,310 00	129,354 00	1.25	
Dunsmuir	2,720 27	6,456 08	388,610 00	504,381 00	.70	1.28
Eagle Rock	12,499 65	20,425 03	1,338,850 00	2,106,503 00	.90	1.00
East San Diego		28,220 69		2,822,069 00		1.00
El Centro	32,755 01	61,436 99	1,780,164 00	3,490,738 00	1.84	1.76
El Monte		5,257 49		438,124 00		1.20
El Paso de Robles	9,810 04	17,860 22	726,670 00	940,017 00	1.35	1.90
El Cajon		4,111 81		372,308 00		.90
Elsinore	3,579 61	736,392 00	265,157 00	391,513 00	1.35	1.81
Emeryville	13,770 91	15,440 25	2,754,175 00	3,088,050 00	.50	.50
Escondido	10,360 08	17,380 00	900,877 00	1,240,958 00	1.15	1.40
Etna	1,336 67	3,722 46	267,250 00	256,722 00	.50	1.45
Eureka	96,558 22	87,240 43	8,778,020 00	7,930,948 00	1.10	1.10
Exeter	6,917 64	13,512 61	395,294 00	750,701 00	1.75	1.80
Fairfield	3,406 20	8,647 80	296,192 00	393,082 00	1.15	2.20
Ferndale	6,876 80	6,990 75	528,985 00	537,750 00	1.30	1.30

SCHEDULE 11—Continued.

Municipal Taxes and Assessments.

Municipality	Total municipal taxes, 1912	Total municipal taxes, 1916	Total nonoperative assessment (city roll) 1912	Total nonoperative assessment (city roll) 1916	Tax rate, 1912	Tax rate, 1916
Fillmore		$4,921 70		$474,830 00		$1.00
Firebaugh				64,230 00		
Fort Bragg	$5,864 82	10,938 23	$509,985 00	754,360 00	$1.15	1.45
Fort Jones	592 18	453 12	148,045 00	181,248 00	.40	.25
Fortuna	5,762 55	6,193 73	457,346 00	458,795 00	1.26	1.35
Fowler	3,264 55	8,512 00	326,455 00	450,005 00	1.00	1.81
Fresno	172,689 30	390,253 64	16,152,763 00	22,578,212 00	$1.00 1.16	1.30
Fullerton	41,019 81	64,180 57	2,646,439 00	4,278,705 00	1.55	1.50
Gilroy	9,479 95	16,707 44	831,575 00	860,998 00	1.14	1.90
Glendale	30,803 81	57,571 76	2,656,609 00	4,954,630 00	1.08 1.18	$1.13 1.15
Glendora	9,227 29	13,736 00	838,845 00	1,100,610 00	1.10	1.25
Grass Valley	14,326 96	13,707 05	1,283,283 00	1,522,926 00	1.05	.90
Gridley	3,689 05	4,735 90	368,905 00	473,590 00	1.00	1.00
Hanford	29,291 36	64,827 45	1,889,620 00	5,038,500 00	1.55	1.28
Hayward	20,136 00	23,914 00	2,013,600 00	2,174,000 00	1.00	1.10
Healdsburg	13,552 56	15,144 52	1,075,600 00	1,111,447 00	1.26	1.35
Hemet	7,509 31	13,453 53	586,665 00		1.28	2.05
Hercules	2,455 00	6,264 00	701,427 00	894,875 00	.35	.70
Hermosa Beach	14,661 49	32,804 66	1,011,137 00	2,343,190 00	1.45	1.40
Hillsborough	33,196 68	51,350 19	2,514,900 00	3,803,730 00	1.32	1.35
Hollister	15,865 68	18,953 17	1,286,215 00	1,418,440 00	.97 1.27	1.35
Holtville	10,859 80	17,406 60	542,990 00	732,860 00	2.00	2.40
Huntington Beach	16,994 60	37,744 74	876,010 00	2,463,025 00	1.94	1.55
Huntington Park	9,593 51	21,935 89	1,063,954 00	2,095,069 00	.90	1.05
Imperial	18,131 76	26,264 50	1,224,795 00	1,375,932 00	1.50	1.90
Inglewood	20,233 87	22,447 41	1,686,156 00	1,824,994 00	1.20	1.23
Jackson	4,225 20	4,410 00	603,600 00	630,001 00	.70	.70
Kennett						
King City	2,629 65	3,772 37	232,965 00	378,237 00	1.00	1.00
Kingsburg	2,953 60	7,966 00	310,905 00	493,280 00	.95	2.00

Lakeport	5,245 24	6,066 46	579,733 00	565,805 00		.90	1.09
La Mesa	3,667 49	5,479 41	366,749 00	456,618 00		1.00	1.20
Larkspur	4,575 04	10,101 60	610,005 00	673,410 00		.75	1.50
Lemoore	6,257 62	8,403 35	227,550 00	560,223 00		2.75	1.50
Lincoln	6,198 30	7,613 91	516,525 00	548,655 00		1.20	1.35
Lindsay	16,660 62	25,027 42	1,110,708 00	1,163,763 00		1.50	2.00
Livermore	9,748 33	16,313 40	886,212 00	932,195 00		1.10	1.15
Lodi	21,165 40	20,321 45	1,693,160 00	2,032,145 00		1.25	1.00
Lompoc	7,411 79	10,761 27	741,179 00	797,131 00		1.00	1.35
Long Beach	272,581 29	390,419 93	21,757,115 00	31,546,464 00	1.09	1.30	1.26
Lordsburg	5,425 01	11,036 73	542,501 00	745,725 00			1.48
Los Angeles	5,420,028 00	6,731,503 95	366,351,415 00	483,325,320 00	1.01	1.05	1.45
Los Banos	5,541 38	8,381 88	369,425 00	614,760 00		1.50	1.30
Los Gatos	15,523 50	30,616 07	1,293,625 00	1,855,515 00		1.20	1.65
Loyalton	3,141 83	4,967 55	418,855 00	21,830 00		.75	1.75
Madera	14,264 32	18,747 35	891,520 00	1,209,507 00		1.60	1.55
Manhattan Beach		37,013 62		2,062,120 00			1.84
Maricopa	9,451 73	4,977 27	945,173 00	585,561 00		1.00	.85
Martinez	13,404 62	23,102 52	1,072,370 00	1,925,210 00		1.25	1.20
Marysville	65,788 78	68,333 24	3,654,555 00	3,956,657 00		1.80	1.90
Mayfield	9,100 77	11,833 07	459,635 00	544,795 00		1.98	2.09
McKittrick	1,737 30	1,206 00	171,730 00	120,600 00		1.00	1.00
Merced	31,241 73	20,891 26	2,349,275 00	1,708,815 00		1.33	1.30
Mill Valley	24,352 12	28,454 68	1,656,675 00	2,189,730 00		1.47	1.15
Modesto	71,074 69	68,115 68	3,841,875 00	4,257,230 00		1.85	1.60
Monrovia	52,851 97	53,816 16	3,523,465 00	4,139,705 00		1.50	1.30
Montague	1,500 00	4,404 20	250,000 00	275,088 00		.60	1.60
Monterey	36,556 03	40,607 84	2,520,594 00	2,671,569 00		1.45	1.52
Morgan Hill	2,769 25	2,797 50	221,540 00	222,819 00		1.25	1.25
Mountain View	13,070 07	13,005 65	708,951 00	846,136 00		1.90	1.50
Napa	36,188 53	54,598 60	3,895,243 00	4,710,755 00		.93	1.16
National City	24,045 91	27,643 05	2,185,824 00	2,468,135 00		1.10	1.12
Needles		4,730 68		378,835 00			.80
Nevada City	8,614 23	8,609 97	861,123 00	860,997 00		1.00	1.00
Newman	6,721 78	7,362 62	448,670 00	520,045 00		1.50	1.40
Newport Beach	17,213 64	28,375 87	1,908,446 00	2,192,509 00		.90	1.30
Oakdale	11,220 70	13,006 62	641,175 00	743,235 00		1.75	1.75

SCHEDULE 11—Continued.

Municipal Taxes and Assessments.

Municipality	Total municipal taxes, 1912	Total municipal taxes, 1916	Total nonoperative assessment (city roll) 1912	Total nonoperative assessment (city roll) 1916	Tax rate, 1912		Tax rate, 1916	
Oakland	$2,218,187 99	$2,672,333 96	$129,465,160 00	$141,945,050 00	$1.46	$1.75		$1.89
Oceanside	11,711 59	13,224 90 9,772 09	555,317 00	651,473 00	1.49	2.12		2.03 1.50
Ontario	35,269 64	35,832 64	2,425,455 00	2,889,730 00	1.10	1.49		1.849
Orange	25,097 82	35,784 02	1,926,910 00	2,727,435 00		1.30		1.30
Orland	4,506 66	11,368 59	396,283 00	568,692 00		1.15		2.00
Oroville	31,675 80	29,280 75	1,712,314 00	1,671,740 00		1.85		1.70
Oxnard	22,879 32	29,453 87	2,079,920 00	2,375,312 00		1.10		1.24
Pacific Grove	31,501 44	27,911 98	2,423,188 00	2,385,640 00		1.30		1.17
Palo Alto	37,307 20	39,385 81	3,927,075 00	4,083,575 00		.95		.95
Pasadena	536,804 81	587,370 29	49,141,915 00	57,756,180 00	1.028	1.11		1.03
Perris	1,604 35	3,168 00	160,435 00	158,050 00		1.00		1.80
Petaluma	50,504 79	58,156 56	5,050,479 00	5,564,600 00		1.00		1.05
Piedmont	71,590 39	79,642 54	5,965,871 00	6,924,946 00		1.20		1.15
Pinole	1,926 88	2,153 43	167,555 00	172,275 00		1.15		1.25
Pittsburg	5,498 50	9,576 40	610,945 00	889,490 00		.90		1.08
Placerville	9,427 44	9,666 36	785,620 00	805,530 00		1.20		1.20
Pleasanton	6,750 00	1,933 20	450,000 00	483,300 00		1.50		.10
Point Arena	752 28	794 65	150,456 00	158,930 00		.50		.50
Pomona	126,579 22	129,883 83	7,671,468 00	7,772,858 00		1.65		1.65
Porterville	31,011 24	34,441 69	2,128,258 00	2,385,017 00	1.122	1.50		1.45
Potter Valley	3,182 70	3,011 91	424,361 00	501,985 00		.75		.60
Red Bluff	16,212 14	20,863 60	1,654,300 00	1,724,265 00		.98		1.21
Reedley	------	12,332 04	------	769,460 00	------	------		1.35
Redding	22,776 68	26,205 63	1,626,906 00	1,497,465 00		1.40		1.75
Redlands	112,832 30	115,356 18	8,680,220 00	8,874,560 00		1.30		1.30
Redondo Beach	23,607 40	57,547 97	2,360,740 00	3,487,756 00		1.00		1.65
Redwood City	32,871 61	34,070 36	1,968,360 00	2,316,710 00		1.67	1.45	1.50
Rialto	4,776 60	9,378 35	1,592,000 00	1,569,928 00		.30		.60
Richmond	88,800 13	207,915 42	12,333,352 00	17,326,285 00		.72		1.20

Rio Vista	6,524 33	8,590 10	434,622 00	572,668 00		1.50		1.50
Riverside	153,253 62	148,752 17	9,460,100 00	9,705,870 00		1.62		1.58
Rocklin	1,200 15	1,483 88	200,025 00	197,851 00		.60		.75
Roseville	12,321 11	12,211 89	912,675 00	1,017,658 00		1.35		1.20
Ross	16,074 48	18,066 18	956,815 00	1,204,412 00		1.68		1.50
Sacramento	796,906 42	839,480 00	63,176,420 00	67,734,151 00	1.15	1.28		1.24
Salinas	24,600 79	31,051 90	2,236,590 00	2,388,608 00		1.10		1.30
San Anselmo	21,659 38	29,492 86	1,377,039 00	1,751,130 00		1.8282		1.78
San Bernardino	78,905 30	91,623 09	4,687,860 00	5,621,085 00	1.35	1.65		1.63
San Bruno		12,200 13		1,353,655 00				.90
San Buenaventura	29,322 90	32,429 70	1,639,700 00	1,801,650 00	1.70	1.80		1.80
San Diego	774,945 25	1,565,365 82	49,068,148 00	83,984,645 00	1.48	1.58		1.98
San Fernando	7,596 60	9,468 76	759,660 00	1,052,085 00		1.00		.90
San Gabriel		14,470 44		1,702,405 00				.85
Sanger	3,148 85	8,201 15	314,885 00	522,740 00		1.00		1.85
San Jacinto	7,729 15	7,336 80	328,900 00	326,080 00		2.35		2.25
San Jose	280,094 54	313,574 18	23,465.310 00	25,801,215 00	1.05	1.20		1.22
San Juan	1,701 51	2,212 27	113,410 00	146,525 00		1.50		1.50
San Leandro	23,385 75	28,751 28	2.338,575 00	2,654,487 00		1.00		1.09
San Luis Obispo	58,871 25	73,179 58	2.762,782 00	3,296.378 00		1.95		2.22
San Marino		20,000 00		3,539,215 00				.57
San Mateo	41,659 31	50,273 67	3,107,505 00	3,559,230 00	1.20	1.38	1.31	1.44
San Rafael	57,042 90	67,754 32	4,875,162 00	5,018,838 00		1.17		1.35
Santa Ana	76,977 60	95,010 43	6.414,800 00	6,786,460 00		1.20		1.40
Santa Barbara	161,960 75	167,285 70	8,823,805 00	11,073,210 00	1.69	1.88		1.00
Santa Clara	29,692 70	34,536 37	2,091,035 00	2,288,241 00		1.42		1.49
Santa Cruz	92,450 53	124,046 37	7,187,815 00	7,070,360 00	1.08	1.33		1.80
Santa Maria	16,172 26	14,752 24	1,078,151 00	1.229,354 00		1.50		1.20
Santa Monica	185,803 72	189,383 63	12,400,465 00	16,049,460 00	1.394	1.52		1.30
Santa Paula	21,517 04	25,305 09	1,195,391 00	1,446,005 00		1.80		1.75
Santa Rosa	82,781 51	85,940 07	6,131,964 00	6,347,885 00		1.35		1.35
Sausalito	28,355 30	35,271 73	2.039,949 00	2,918,900 00		1.39		1.64
Sawtelle	8,728 89	17,389 29	872,889 00	1,831,903 00		1.00		1.25
Sebastopol	10,624 32	10,552 89	758,880 00	857,040 00		1.40		1.20
Selma	14,999 07	6,575 40	857,090 00	1,095,900 00		1.75		1.50
Sierra Madre	19,945 57	25,825 00	1,366,135 00	1,566,585 00		1.46		1.70

SCHEDULE 11—Concluded.

Municipal Taxes and Assessments.

Municipality	Total municipal taxes, 1912	Total municipal taxes, 1916	Total nonoperative assessment (city roll) 1912	Total nonoperative assessment (city roll) 1916	Tax rate, 1912	Tax rate, 1916
Sisson	$3,281 95	$2,643 52	$410,237 00	$351,620 00	$0.80	$0.75
Sonoma	6,775 92	8,743 67	542,074 00	596,706 00	1.25	1.45
Sonora	7,705 75	11,264 68	1,040,765 00	1,052,774 00	.75	1.07
South Pasadena	57,123 80	91,099 00	4,398,165 00	6,282,845 00	1.30	1.45
South San Francisco	8,898 58	17,606 60	1,394,253 00	1,760,660 00	.65	1.00
Stanton	6,069 45	3,418 20	606,945 00	341,820 00	1.00	1.00
St. Helena	12,515 05	10,148 58	1,251,505 00	1,353,255 00	1.00	.75
Stockton	360,986 66	557,812 50	22,283,040 00	27,142,763 00	1.62	1.60
Suisun	6,866 29	7,882 58	457,753 00	477,145 00	1.50	1.58
Sunnyvale	----------	12,429 84	----------	812,415 00	----------	1.53
Susanville	3,431 11	6,888 40	343,111 00	459,227 00	1.00	1.50
Sutter Creek	----------	2,955 30	394,040 00	----------	----------	.75
Taft	11,109 31	12,608 25	896,986 00	829,490 00	1.35	1.52
Tehachapi	955 60	3,107 42	95,560 00	165,290 00	1.00	1.88
Tehama	996 05	1,487 06	99,605 00	118,965 00	1.00	1.25
Tracy	7,821 91	12,349 28	521,461 00	667,529 00	1.50	1.85
Trinidad	252 03	----------	33,605 00	----------	.75	----------
Tropico	9,393 72	15,779 00	816,845 00	1,332,540 00	1.15	1.21
Tulare	22,220 32	26,932 31	1,388,770 00	1,857,401 50	1.60	1.45
Turlock	14,407 39	21,588 07	1,051,590 00	1,163,768 00	1.37	1.70
Ukiah	12,034 20	11,701 96	1,002,850 00	1,063,813 00	1.20	1.10
Upland	21,677 25	28,511 60	1,505,365 00	1,781,975 00	1.44	.60
Vacaville	8,831 24	10,537 89	519,485 00	638,660 00	1.70	1.65
Vallejo	63,064 19	99,706 08	5,045,135 00	4,985,450 00	1.25	2.00
Venice	104,996 30	129,245 27	8,175,922 00	10,538,715 00	1.30	1.20
Vernon	10,609 61	25,434 00	1,711,230 00	3,391,235 00	.62	.75
Visalia	49,520 82	39,422 01	3,194,892 00	3,424,455 00	1.55	1.07
Walnut Creek	----------	2,236 10	----------	----------	----------	----------
Watsonville	25,643 47	28,889 65	2,442,235 00	2,626,334 00	1.05	1.10

Watts	10,384 20	14,470 60	1,038,420 00	1,147,410 00		1.00		1.22
Wheatland	3,686 64	3,664 59	223,433 00	244,306 00		1.65		1.50
Whittier	58,242 00	65,101 11	3,409,038 00	3,959,576 00	$1.41	1.85	$1.41	1.67
Willits	5,549 82	6,027 10	470,323 00	539,790 00		1.18		1.207
Willows	19,069 95	22,355 60	1,501,571 00	1,600,857 00		1.27		1.44
Winters	5,927 16	7,211 65	370,460 00	437,070 00		1.60		1.60
Woodland	29,106 20	44,515 81	2,291,622 00	2,734,238 00		1.26		1.60
Yreka	8,916 16	10,711 44	597,415 00	669,465 00		1.50		1.60
Yuba City	6,772 02	9,598 15	564,335 00	655,353 00		1.20		1.30

SCHED

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 1	No. of corporations	Corporation Class 2	No. of corporations	Corporation Class 3
Total amount paid in for stock	95	$2,221,005	61	$4,244,746	82	$3,435,549
Total debt	95	$331,029	61	$4,077,871	82	$766,087
Showing gross receipts not exceeding $10,000	54	$235,548	20	$44,432	33	$118,540
Net profits reported		25,925		2,442		7,[illegible]
Assessed value		42,262		1,140		30,305
Actual value reported		121,415		2,244		18,668
Franchise assessment		54,500		19,500		37,500
Franchise tax		654		234		450
Total tax reported		2,539		256		780
License tax (levied since 1915)		945		395		1,180
Showing gross receipts from $10,000 to $20,000	16	$244,980	9	$145,982	13	$176,825
Net profits reported		34,436		7,844		8,252
Assessed value		22,745		7,371		5,872
Actual value reported		135,894		12,192		7,744
Franchise assessment		30,000		13,500		16,250
Franchise tax		330		162		195
Total tax reported		1,517		462		502
License tax (levied since 1915)		410		150		305
Showing gross receipts from $20,000 to $50,000	14	$411,525	11	$395,506	17	$551,226
Net profits reported		94,350		24,025		31,505
Assessed value		289,230		3,614		60,795
Actual value reported		718,556		3,564		102,345
Franchise assessment		58,500		25,250		39,500
Franchise tax		702		303		474
Total tax reported		14,566		4,723		2,701
License tax (levied since 1915)		455		220		370
Showing gross receipts from $50,000 to $150,000	2	$160,657	3	$243,602	11	$1,038,829
Net profits reported		40,227		21,453		14,762
Assessed value		32,000		3,010		83,161
Actual value reported		207,174		3,230		76,486
Franchise assessment		19,500		5,750		37,250
Franchise tax		234		69		447
Total tax reported		1,820		786		2,639
License tax (levied since 1915)		125		140		265
Showing gross receipts from $150,000 to $500,000	0	----------	3	$815,564	1	$172,272
Net profits reported		----------		16,743		----------
Assessed value		----------		114,738		----------
Actual value reported		----------		----------		----------
Franchise assessment		----------		37,000		5,000
Franchise tax		----------		444		60
Total tax reported		----------		13,647		407
License tax (levied since 1915)		----------		220		15
Showing gross receipts exceeding $500,000	0	----------	4	$9,587,935	3	$4,072,372
Net profits reported		----------		125,391		113,467
Assessed value		----------		11,699		4,854
Actual value reported		----------		200		8,301
Franchise assessment		----------		55,250		40,000
Franchise tax		----------		663		480
Total tax reported		----------		23,543		3,755
License tax (levied since 1915)		----------		365		875
Inoperative corporations	9	----------	11	----------	4	----------
Assessed value		----------		$50		$8,231
Actual value reported		$250		----------		8,231
Franchise assessment		5,750		8,750		3,500
Franchise tax		69		105		42
Total tax reported		----------		----------		----------
License tax (levied since 1915)		190		255		100
Total franchise assessment	95	$168,250	61	$165,000	82	$179,000
Total franchise tax		2,019		1,980		2,148
Gross receipts of corporations reporting no profits	30	$152,037	28	$4,085,742	40	$1,222,401

ULE 12

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 4	No. of corporations	Corporation Class 5	No. of corporations	Corporation Class 6	No. of corporations	Corporation Class 7	No. of corporations	Corporation Class 8	No. of corporations	Corporation Class 9
171	$5,040,268	10	$114,900	17	$654,252	5	$82,200	12	$210,304	76	$1,214,301
171	$8,581,901	10	$75,151	17	$372,303	5	$48,451	12	$70,920	76	$549,606
44	$173,154	4	$26,831	3	$14,297	2	$12,903	4	$22,484	19	$117,558
	10,031		1,251		406		487		313		9,654
	363,255		13,344		18,285		315		645		39,293
	538,322		23,390		3,500		-----------		175		84,002
	67,000		3,500		3,500		1,750		4,000		21,000
	804		42		42		21		48		252
	7,409		420		255		214		44		3,259
	1,100		60		30		20		70		420
16	$221,189	2	$30,528	1	$10,270	0	-----------	1	$13,680	20	$307,989
	12,404		-----------		-----------		-----------		243		14,010
	306,055		7,665		-----------		-----------		700		32,662
	419,337		35,287		-----------		-----------		700		55,897
	49,000		2,250		1,250		-----------		1,500		23,000
	588		27		15		-----------		18		276
	12,077		410		50		-----------		75		1,956
	450		20		15		-----------		10		320
30	$955,412	3	$95,328	2	$55,289	0	-----------	1	$43,023	19	$640,344
	98,962		1,988		2,776		-----------		7,603		24,859
	40,995		7,885		3,353		-----------		975		104,559
	182,438		20,415		3,353		-----------		-----------		70,099
	75,000		4,000		3,250		-----------		5,000		31,500
	900		48		39		-----------		60		378
	3,825		462		218		-----------		298		3,190
	2,550		390		35		-----------		50		705
16	$1,571,187	1	$56,134	2	$153,022	2	$196,856	1	$83,135	6	$483,135
	49,960		-----------		3,410		5,245		6,173		16,519
	369,250		7,798		16,615		2,810		200		44,595
	207,320		15,200		43,246		-----------		1,700		99,421
	73,250		1,250		4,750		6,000		3,000		22,250
	879		15		57		72		36		237
	20,548		156		837		63		145		2,945
	665		10		35		25		25		110
12	$2,964,082	0	-----------	8	$2,128,831	1	$459,610	2	$411,686	1	$366,495
	190,462		-----------		29,877		15,269		5,576		1,267
	48,468		-----------		72,996		770		485		-----------
	73,103		-----------		115,780		1,000		1,637		191,230
	158,250		-----------		42,500		11,500		4,500		10,000
	1,899		-----------		510		138		54		120
	7,971		-----------		10,140		291		916		1,580
	580		-----------		675		20		45		20
1	$2,696,879	0	-----------	1	$536,909	0	-----------	0	-----------	0	-----------
	201,608		-----------		10,322		-----------		-----------		-----------
	538,475		-----------		93,400		-----------		-----------		-----------
	1,069,650		-----------		-----------		-----------		-----------		-----------
	83,500		-----------		17,000		-----------		-----------		-----------
	1,002		-----------		204		-----------		-----------		-----------
	42,341		-----------		3,632		-----------		-----------		-----------
	200		-----------		75		-----------		-----------		-----------
52	-----------	0	-----------	0	-----------	0	-----------	3	-----------	11	-----------
	$219,680		-----------		-----------		-----------		-----------		$550
	340,520		-----------		-----------		-----------		-----------		12,705
	67,000		-----------		-----------		-----------		$2,500		9,000
	804		-----------		-----------		-----------		30		108
	275		-----------		-----------		-----------		8		-----------
	2,170		-----------		-----------		-----------		90		125
171	$573,000	10	$11,000	17	$72,250	5	$19,250	12	$20,500	76	$116,750
	6,876		132		867		231		246		1,401
55	$2,052,538	5	$131,729	6	$895,360	1	$60,902	1	$3,091	23	$333,418

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 10	No. of corporations	Corporation Class 11	No. of corporations	Corporation Class 12
Total amount paid in for stock	118	$3,771,725	56	$5,195,704	45	$814,327
Total debt	118	$5,037,492	56	$3,335,659	45	$363,217
Showing gross receipts not exceeding $10,000	17	$71,572	3	$13,887	7	$47,005
Net profits reported		2,934		----------		1,197
Assessed value		12,475		----------		11,500
Actual value reported		39,695		----------		7,650
Franchise assessment		17,000		3,250		7,250
Franchise tax		204		39		87
Total tax reported		428		53		229
License tax (levied since 1915)		370		70		80
Showing gross receipts from $10,000 to $20,000	7	$99,247	4	$49,479	3	$44.355
Net profits reported		6,010		2,971		1,197
Assessed value		64,537		2.850		3,000
Actual value reported		64.898		2,100		3,000
Franchise assessment		10,250		5,000		2,000
Franchise tax		123		60		24
Total tax reported		1,634		147		209
License tax (levied since 1915)		110		100		35
Showing gross receipts from $20,000 to $50,000	22	$759,418	5	$169,338	11	$403.176
Net profits reported		29,809		6,271		7,717
Assessed value		29,796		4,944		5,255
Actual value reported		158,353		3,460		9,186
Franchise assessment		34,500		7,000		18,000
Franchise tax		414		84		216
Total tax reported		9,462		1,860		812
License tax (levied since 1915)		390		70		170
Showing gross receipts from $50,000 to $150,000	26	$2,213,421	17	$1,374,024	16	$1,288,421
Net profits reported		70,714		63,689		51,261
Assessed value		70,228		88,230		50,735
Actual value reported		158,760		221,958		91,860
Franchise assessment		63,250		44,000		58,750
Franchise tax		759		528		705
Total tax reported		5,399		5,072		4,082
License tax (levied since 1915)		540		355		260
Showing gross receipts from $150,000 to $500,000	18	$5,073,485	14	$3,393,761	6	$1,593,970
Net profits reported		142,585		152,283		56,348
Assessed value		311,170		273,198		45,861
Actual value reported		374,965		526,762		106,520
Franchise assessment		134,750		98,500		37,500
Franchise tax		1,617		1,182		450
Total tax reported		12,198		10,256		6,745
License tax (levied since 1915)		545		470		170
Showing gross receipts exceeding $500,000	9	$18,068,871	6	$4,815,683		----------
Net profits reported		289,863		232,572		----------
Assessed value		354,015		335,457		----------
Actual value reported		661,860		434,273		----------
Franchise assessment		224,500		183,000		----------
Franchise tax		2,694		2,196		----------
Total tax reported		23,051		23,541		----------
License tax (levied since 1915)		250		800		----------
Inoperative corporations	19	----------	7	----------	2	----------
Assessed value		$5,130		$61,100		----------
Actual value reported		26,572		5,000		----------
Franchise assessment		18,000		5,500		$1,500
Franchise tax		216		66		18
Total tax reported		305		10		----------
License tax (levied since 1915)		295		250		20
Total franchise assessment	118	$502,250	56	$346,250	45	$125,000
Total franchise tax		6,027		4,155		1,500
Gross receipts of corporations reporting no profits	32	$8,911,642	16	$962,518	17	$958,859

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 13	No. of corporations	Corporation Class 14	No. of corporations	Corporation Class 15	No. of corporations	Corporation Class 16	No. of corporations	Corporation Class 17	No. of corporations	Corporation Class 18
4	$12,450	15	$941,945	53	$1,933,706	14	$418,280	4	$51,000	17	$1,127,017
4	$7,500	15	$171,482	53	$824,983	14	$146,421	4	$7,807	17	$875,115
1	$7,006	3	$17,727	19	$73,295	2	$4,151	1	$9,966	1	$5,837
	696		1,820		7,356		----------		----------		----------
	200		36,640		71,355		----------		2,500		----------
	612		86,200		47,920		----------		3,500		----------
	1,000		3,500		20,500		1,750		1,000		1,000
	12		42		246		21		12		12
	20		717		2,209		21		83		----------
	10		45		430		25		20		20
	----------	3	$41,056	9	$126,400		----------	1	$12,210	1	$17,157
	----------		3		6,910		----------		----------		1,355
	----------		3,300		21,205		----------		1,875		885
	----------		800		67,081		----------		11,750		----------
	----------		3,000		15,000		----------		750		1,000
	----------		36		180		----------		9		12
	----------		275		966		----------		----------		40
	----------		55		155		----------		15		20
2	$69,440	4	$121,004	10	$3,090	5	$170,143	2	$63,076	3	$95,380
	----------		5,802		22,355		2,135		1,502		907
	7,860		600		85,755		4,050		2,047		8,375
	10,860		1,000		148,552		11,229		2,865		10,730
	2,000		6,250		22,250		8,000		3,000		4,500
	24		75		267		96		36		54
	227		3,319		2,229		204		1,897		478
	35		70		315		85		40		30
	----------	2	$165,569	6	$517,597	5	$429,547		----------	3	$396,753
	----------		14,764		60,836		13,165		----------		24,778
	----------		556,187		65,220		21,185		----------		21,699
	----------		274 000		117,480		52,329		----------		1,828
	----------		40,000		33,000		13,250		----------		12,500
	----------		480		396		159		----------		150
	----------		12,912		2,945		1,290		----------		854
	----------		150		225		105		----------		50
	----------		----------		----------	1	$409,176		----------	6	$1,798,958
	----------		----------		----------		13,128		----------		31,863
	----------		----------		----------		1,200		----------		134,679
	----------		----------		----------		1,500		----------		112,742
	----------		----------		----------		10,000		----------		38,500
	----------		----------		----------		120		----------		462
	----------		----------		----------		573		----------		4,798
	----------		----------		----------		25		----------		145
	----------		----------	1	$6,784,555	1	$572,358		----------	3	$2,524,927
	----------		----------		2,381,122		16,407		----------		99,533
	----------		----------		3,570		9,900		----------		228,005
	----------		----------		----------		----------		----------		100,427
	----------		----------		8,500		12,000		----------		68,500
	----------		----------		102		144		----------		822
	----------		----------		99,166		742		----------		7,266
	----------		----------		25		25		----------		175
1	----------	3	----------	8	----------		----------		----------		----------
	----------		----------		$790		----------		----------		----------
	----------		----------		3,290		----------		----------		----------
	$500		$2,750		6,750		----------		----------		----------
	6		33		81		----------		----------		----------
	----------		----------		20		----------		----------		----------
	10		85		360		----------		----------		----------
4	$3,500	15	$55,500	53	$106,000	14	$45,000	4	$4,750	17	$126,000
	42		666		1,272		540		57		1,512
2	$69,440	3	$62,804	13	$211,264	5	$215,180	3	$60,399	4	$489,969

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 19	No. of corporations	Corporation Class 20	No. of corporations	Corporation Class 21
Total amount paid in for stock	52	$1,205,352	33	$721,780	80	$11,318,772
Total debt	52	$1,700,234	33	$280,398	80	$61,461,343
Showing gross receipts not exceeding $10,000	3	$12,402	14	$56,984	6	$22,290
Net profits reported		2,280		3,798		3,061
Assessed value		6,900		16,560		8,335
Actual value reported		12,555		59,645		11,297
Franchise assessment		3,250		16,250		6,000
Franchise tax		39		195		72
Total tax reported		294		893		101
License tax (levied since 1915)		30		220		95
Showing gross receipts from $10,000 to $20,000	6	$99,358	4	$58,558	2	$29,673
Net profits reported		55		3,601		235
Assessed value		35,320		3,908		1,175
Actual value reported		23,500		1,198		1,400
Franchise assessment		7,250		7,000		2,000
Franchise tax		87		84		24
Total tax reported		698		277		26
License tax (levied since 1915)		100		60		20
Showing gross receipts from $20,000 to $50,000	19	$628,390	6	$159,321	9	$283,868
Net profits reported		39,645		43,912		7,544
Assessed value		52,442		23,779		17,251
Actual value reported		80,547		34,884		21,141
Franchise assessment		30,000		24,500		17,750
Franchise tax		360		294		213
Total tax reported		2,922		1,611		757
License tax (levied since 1915)		290		175		180
Showing gross receipts from $50,000 to $150,000	14	$1,084,186	4	$311,284	14	$1,290,914
Net profits reported		25,962		32,483		52,206
Assessed value		175,613		1,300		502,219
Actual value reported		255,797		1,500		2,441,502
Franchise assessment		33,000		21,500		89,750
Franchise tax		396		258		1,077
Total tax reported		5,516		1,011		15,313
License tax (levied since 1915)		230		75		430
Showing gross receipts from $150,000 to $500,000	8	$2,466,591	0	----------	23	$6,178,919
Net profits reported		66,190		----------		169,151
Assessed value		147,930		----------		552,741
Actual value reported		272,912		----------		1,125,871
Franchise assessment		68,000		----------		259,500
Franchise tax		816		----------		3,114
Total tax reported		7,627		----------		14,859
License tax (levied since 1915)		235		----------		660
Showing gross receipts exceeding $500,000	2	$1,377,030	0	----------	18	366,864,145
Net profits reported		68,285		----------		3,194,649
Assessed value		197,890		----------		1,758,005
Actual value reported		436,436		----------		2,788,490
Franchise assessment		40,000		----------		1,400,250
Franchise tax		480		----------		16,803
Total tax reported		5,997		----------		487,808
License tax (levied since 1915)		45		----------		1,800
Inoperative corporations	0	----------	5	----------	8	----------
Assessed value		----------		----------		$41,596
Actual value reported		----------		----------		101,605
Franchise assessment		----------		$8,250		110,500
Franchise tax		----------		99		1,326
Total tax reported		----------		----------		----------
License tax (levied since 1915)		----------		200		500
Total franchise assessment	52	$181,500	33	$77,500	80	$1,885,750
Total franchise tax		2,178		930		22,629
Gross receipts of corporations reporting no profits	12	$1,215,310	9	$117,105	17	$7,110,123

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 22	No. of corporations	Corporation Class 23	No. of corporations	Corporation Class 24	No. of corporations	Corporation Class 25	No. of corporations	Corporation Class 26	No. of corporations	Corporation Class 27
40	$662,725	93	$21,608,678	69	$2,371,003	148	$1,090,169	40	$391,304	38	$1,286,073
40	$388,090	93	$20,157,594	69	$681,313	148	$1,031,578	40	$71,956	38	$101,503
5	$14,628	10	$36,358	43	$73,108	56	$96,948	19	$37,744	10	$32,459
	966		2,732		16,782		6,350		980		1,369
	64,975		18,075		150,192		233,937		16,485		4,130
	64,335		38,200		295,748		358,873		24,625		7,100
	5,750		10,500		39,250		39,250		11,750		8,000
	69		126		471		471		141		96
	2,089		234		4,769		5,466		1,015		201
	90		185		665		745		200		140
1	$14,804	5	$78,223	5	$66,258	5	$62,337	1	$10,363	1	$18,124
	1,307		389		26,831		4,687		6,151		----------
	5,920		1,050		44,470		23,087		14,500		300
	11,000		18,087		189,500		63,605		----------		----------
	2,000		7,750		27,500		4,250		500		500
	24		93		330		51		6		6
	198		166		3,283		790		286		32
	20		90		160		75		75		10
13	$450,988	12	$406,806	8	$248,606	3	$87,187	2	$61,039	2	$48,895
	21,955		49,704		76,155		7,733		----------		5,312
	30,421		55,213		220,920		3,500		----------		12,180
	37,208		127,641		304,854		9,000		1,000		48,281
	25,000		20,250		50,000		3,750		1,250		2,250
	300		243		600		45		15		27
	6,297		839		7,187		125		10		179
	245		330		245		45		45		35
10	$1,016,484	12	$925,049	4	$304,163	3	$226,434	2	$215,492	6	$516,412
	15,961		73,790		74,315		21,591		55,591		24,000
	29,549		96,065		632,965		88,000		18,534		10,783
	136,270		330,712		1,314,992		228,500		19,000		43,125
	23,500		40,750		45,500		2,750		1,500		8,000
	282		489		546		33		18		96
	4,121		7,971		12,921		101		451		390
	250		315		185		30		35		125
4	$940,371	22	$5,906,090	0	----------	1	$484,275	0	----------	1	$201,129
	9,730		418,024		----------		----------		----------		----------
	6,200		511,096		----------		472,950		----------		1,500
	----------		369,922		----------		1,509,556		----------		6,000
	26,000		270,000		----------		2,500		----------		2,500
	312		3,240		----------		30		----------		30
	1,122		22,673		----------		16,918		----------		69
	80		850		----------		75		----------		20
4	$3,139,082	12	$87,161,359	0	----------	0	----------	0	----------	2	$3,873,803
	32,325		4,495,875		----------		----------		----------		62,953
	47,574		1,818,269		----------		----------		----------		18,740
	130,350		20,201,975		----------		----------		----------		4,600
	71,000		1,315,750		----------		----------		----------		5,750
	852		15,789		----------		----------		----------		69
	3,637		238,506		----------		----------		----------		980
	80		2,235		----------		----------		----------		210
3	----------	20	----------	9	----------	80	----------	16	----------	16	----------
	$5,430		$1,525		$50,180		$49,105		$2,020		----------
	6,000		13,400		52,400		204,190		2,500		----------
	2,750		16,250		8,750		54,250		12,250		$10,500
	33		195		105		651		147		126
	----------		----------		1,164		234		113		----------
	275		670		240		905		255		655
40	$156,000	93	$1,681,250	69	$171,000	148	$106,750	40	$27,250	38	$37,500
	1,872		20,175		2,052		1,281		327		450
15	$1,445,437	20	$1,084,644	15	$153,475	33	$626,677	14	$88,326	11	$1,117,195

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 28	No. of corporations	Corporation Class 29	No. of corporations	Corporation Class 30
Total amount paid in for stock	46	$329,192	40	$10,115,802	30	$5,813,346
Total debt	46	$149,698	40	$9,685,407	30	$125,876
Showing gross receipts not exceeding $10,000	26	$70,903	5	$18,894	3	$20,356
Net profits reported		9,174		1,317		----------
Assessed value		1,725		11,493		----------
Actual value reported		3,290		15,253		750
Franchise assessment		25,250		8,000		3,750
Franchise tax		303		96		45
Total tax reported		348		75		15
License tax (levied since 1915)		315		135		110
Showing gross receipts from $10,000 to $20,000	1	$13,400	1	$10,961	1	$16,367
Net profits reported		1		2,610		550
Assessed value		----------		----------		----------
Actual value reported		300		----------		----------
Franchise assessment		1,500		1,750		1,000
Franchise tax		18		21		12
Total tax reported		56		20		----------
License tax (levied since 1915)		10		10		75
Showing gross receipts from $20,000 to $50,000	3	$84,594	10	$337,150	2	$64,003
Net profits reported		3,788		48,278		1,189
Assessed value		11,800		24,733		----------
Actual value reported		16,600		58,750		----------
Franchise assessment		12,250		35,250		3,000
Franchise tax		147		423		36
Total tax reported		661		1,837		24
License tax (levied since 1915)		90		305		225
Showing gross receipts from $50,000 to $150,000	0	----------	6	$597,588	0	----------
Net profits reported		----------		228,461		----------
Assessed value		----------		30,737		----------
Actual value reported		----------		35,551		----------
Franchise assessment		----------		118,000		----------
Franchise tax		----------		1,416		----------
Total tax reported		----------		2,119		----------
License tax (levied since 1915)		----------		510		----------
Showing gross receipts from $150,000 to $500,000	0	----------	11	$3,083,053	0	----------
Net profits reported		----------		312,364		----------
Assessed value		----------		131,228		----------
Actual value reported		----------		438,443		----------
Franchise assessment		----------		310,250		----------
Franchise tax		----------		3,723		----------
Total tax reported		----------		4,656		----------
License tax (levied since 1915)		----------		1,440		----------
Showing gross receipts exceeding $500,000	0	----------	4	$3,559,905	0	----------
Net profits reported		----------		344,201		----------
Assessed value		----------		64,739		----------
Actual value reported		----------		138,316		----------
Franchise assessment		----------		38,000		----------
Franchise tax		----------		456		----------
Total tax reported		----------		1,144		----------
License tax (levied since 1915)		----------		275		----------
Inoperative corporations	16	----------	3	----------	24	----------
Assessed value		----------		$100		$55,000
Actual value reported		$2,011		----------		184,870
Franchise assessment		14,000		3,000		24,750
Franchise tax		168		36		297
Total tax reported		50		4,254		----------
License tax (levied since 1915)		240		70		1,245
Total franchise assessment	46	$53,000	40	$514,250	30	$32,500
Total franchise tax		636		6,171		390
Gross receipts of corporations reporting no profits	22	$111,019	12	$3,432,904	4	$41,272

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 31	No. of corporations	Corporation Class 32	No. of corporations	Corporation Class 33	No. of corporations	Corporation Class 34	No. of corporations	Corporation Class 35	No. of corporations	Corporation Class 36
58	$1,016,088	23	$327,373	23	$3,411,729	95	$5,575,177	27	$13,476,040	46	$8,790,288
58	$651,141	26	$308,442	23	$1,675,838	95	$3,880,512	27	$3,138,223	46	$5,020,805
23	$80,083	5	$33,312	2	$4,998	14	$48,898	1	$1,000	4	$18,861
	3,564		3,905		-----------		4,554		-----------		720
	88,177		3,500		-----------		65,500		-----------		15,150
	209,537		13,200		1,424		303,403		-----------		48,396
	23,750		5,500		2,250		14,750		1,000		5,750
	285		66		27		177		12		69
	1,755		167		-----------		343		-----------		349
	425		75		40		360		25		65
7	$109,987	4	$60,102	4	$51,804	8	$137,145	2	$34,962	1	$16,857
	2,258		3,028		5,965		10,151		2,115		-----------
	19,180		6,750		137,648		28,238		50		-----------
	57,670		4,000		235,364		85,657		100		37,500
	9,500		3,250		5,750		17,500		2,250		1,750
	114		39		69		210		27		21
	639		207		428		780		15		109
	140		45		80		180		20		10
4	$114,935	11	$362,290	1	$40,624	11	$370,757	4	$156,912	6	$178,822
	8,102		4,523		-----------		5,257		135		16,745
	150		329,695		75		67,314		9,060		68,155
	200		350,700		75		99,122		9,937		186,421
	6,250		15,500		1,250		20,000		6,250		11,750
	75		186		15		240		75		141
	98		822		10		3,619		241		4,612
	65		195		10		285		70		185
11	$867,788	4	$348,727	6	$682,181	25	$1,906,978	9	$762,617	15	$1,488,500
	30,496		3,250		51,145		294,095		23,210		91,863
	74,238		1,440		92,966		357,978		45,090		125,079
	169,579		18,000		323,900		880,941		37,237		457,777
	25,000		12,250		63,250		170,750		28,750		111,000
	300		147		759		2,049		345		1,332
	1,581		13,652		6,154		9,282		1,182		8,269
	185		75		165		1,705		160		410
2	$448,329	1	$480,845	4	$1,284,104	14	$3,593,701	4	$1,336,121	9	$2,149,595
	47,117		220		101,601		187,485		99,802		90,570
	47,130		1,800		38,555		100,175		25,027		121,650
	81,698		4,400		39,935		117,950		33,690		95,485
	18,500		2,000		120,250		141,500		28,500		65,500
	222		24		1,443		1,698		342		786
	1,291		576		8,373		5,020		1,883		7,485
	40		20		135		385		130		130
0	-----------	0	-----------	2	$6,535,756	6	$6,647,210	2	$5,497,814	5	$13,688,681
	-----------		-----------		554,257		217,394		435,120		483,045
	-----------		-----------		8,463		80,818		17,993		478,960
	-----------		-----------		3,000		158,855		39,544		447,997
	-----------		-----------		226,000		127,500		50,000		436,000
	-----------		-----------		2,712		1,530		600		5,232
	-----------		-----------		36,645		14,366		40,039		79,732
	-----------		-----------		400		315		1,075		695
11	-----------	1	-----------	4	-----------	17	-----------	5	-----------	6	-----------
	$3,250		$980		-----------		$21,160		-----------		-----------
	5,000		-----------		-----------		21,167		$1,005		$4,396
	9,750		750		$5,750		15,500		4,250		5,250
	117		9		69		186		51		63
	67		-----------		44		38		-----------		70
	165		20		60		490		165		85
58	$92,750	26	$39,250	23	$424,500	95	$507,500	27	$121,000	46	$637,000
	1,113		471		5,094		6,090		1,452		7,644
21	$250,089	11	$361,578	8	$895,797	36	$6,352,667	8	$539,426	14	$10,758,234

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 37	No. of corporations	Corporation Class 38	No. of corporations	Corporation Class 39
Total amount paid in for stock	7	$1,026,126	10	$66,340	15	$662,865
Total debt	7	$1,520,572	10	$114,181		----------
Showing gross receipts not exceeding $10,000		----------	1	$6,000	6	$13,345
Net profits reported		----------		1,325		271
Assessed value		----------		----------		3,690
Actual value reported		----------		----------		2,400
Franchise assessment		----------		1,000		5,500
Franchise tax		----------		12		66
Total tax reported		----------		175		105
License tax (levied since 1915)		----------		10		70
Showing gross receipts from $10,000 to $20,000	1	$17,426		----------	1	$12,214
Net profits reported		----------		----------		1,260
Assessed value		7,710		----------		200
Actual value reported		7,710		----------		200
Franchise assessment		1,000		----------		1,000
Franchise tax		12		----------		12
Total tax reported		179		----------		33
License tax (levied since 1915)		20		----------		20
Showing gross receipts from $20,000 to $50,000		----------		----------		----------
Net profits reported		----------		----------		----------
Assessed value		----------		----------		----------
Actual value reported		----------		----------		----------
Franchise assessment		----------		----------		----------
Franchise tax		----------		----------		----------
Total tax reported		----------		----------		----------
License tax (levied since 1915)		----------		----------		----------
Showing gross receipts from $50,000 to $150,000		----------	1	$91,401		----------
Net profits reported		----------		24,136		----------
Assessed value		----------		----------		----------
Actual value reported		----------		100,000		----------
Franchise assessment		----------		6,000		----------
Franchise tax		----------		72		----------
Total tax reported		----------		----------		----------
License tax (levied since 1915)		----------		20		----------
Showing gross receipts from $150,000 to $500,000	4	$1,011,146		----------	1	$417,715
Net profits reported		70,826		----------		43,016
Assessed value		63,806		----------		1,000
Actual value reported		----------		----------		1,000
Franchise assessment		46,000		----------		3,000
Franchise tax		552		----------		36
Total tax reported		1,806		----------		1,060
License tax (levied since 1915)		135		----------		75
Showing gross receipts exceeding $500,000	2	$2,062,669		----------	1	$3,450,000
Net profits reported		62,255		----------		----------
Assessed value		251,030		----------		----------
Actual value reported		205,600		----------		----------
Franchise assessment		70,000		----------		25,000
Franchise tax		840		----------		300
Total tax reported		26,377		----------		12,944
License tax (levied since 1915)		300		----------		350
Inoperative corporations		----------	8	----------	6	----------
Assessed value		----------		$12,850		----------
Actual value reported		----------		43,500		----------
Franchise assessment		----------		5,500		$4,250
Franchise tax		----------		66		51
Total tax reported		----------		17		10
License tax (levied since 1915)		----------		60		40
Total franchise assessment	7	$117,000	10	$12,500	15	$38,750
Total franchise tax		1,404		150		465
Gross receipts of corporations reporting no profits	1	$17,426		----------	4	$3,450,698

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 40	No. of corporations	Corporation Class 41	No. of corporations	Corporation Class 42	No. of corporations	Corporation Class 43	No. of corporations	Corporation Class 44	No. of corporations	Corporation Class 45
13	$2,819,200	130	$4,709,860	21	$1,060,337	5	$196,685	7	$23,732	23	$3,769,091
13	$1,688,511	130	$2,679,491	21	$737,084	5	$68,172	7	$1,000	23	$2,059,736
	-----------	25	$75,237	2	$2,873	1	$5,286	3	$13,434		-----------
	-----------		10,746		-----------		2,256		465		-----------
	-----------		181,889		3,100		-----------		-----------		-----------
	-----------		512,161		-----------		-----------		1,500		-----------
	-----------		29,000		1,750		1,000		2,250		-----------
	-----------		348		21		12		27		-----------
	-----------		3,441		129		-----------		18		-----------
	-----------		375		20		10		40		-----------
	-----------	11	$155,340	1	$11,875	1	$11,163	3	$46,917		-----------
	-----------		8,558		722		2,172		2,408		-----------
	-----------		112,226		807		-----------		1,000		-----------
	-----------		287,643		807		-----------		15,300		-----------
	-----------		16,750		3,500		1,000		3,750		-----------
	-----------		201		42		12		45		-----------
	-----------		2,075		249		52		8		-----------
	-----------		180		20		15		35		-----------
5	$164,924	16	$567,770	3	$92,866	1	$37,924		-----------	1	$26,642
	14,372		28,587		1,632		1,248		-----------		471
	45,131		281,858		18,885		-----------		-----------		-----------
	75,851		397,560		90,524		-----------		-----------		-----------
	11,750		38,750		4,250		1,250		-----------		1,500
	141		465		51		15		-----------		18
	1,723		9,679		365		-----------		-----------		70
	95		310		85		20		-----------		10
4	$378,316	31	$3,249,813	2	$225,848		-----------		-----------	5	$399,974
	-----------		89,949		23		-----------		-----------		9,296
	50,650		189,955		9,205		-----------		-----------		35,150
	78,425		323,535		-----------		-----------		-----------		62.300
	15,500		75,500		5,750		-----------		-----------		13,500
	186		906		69		-----------		-----------		162
	1,941		11,743		91		-----------		-----------		2,077
	95		550		45		-----------		-----------		95
2	$620,763	27	$6,733,527	4	$1,307,503	2	$454,661		-----------	7	$1,796,138
	2,735		107,131		21,434		17,241		-----------		62,939
	179,126		422,560		36,345		54,470		-----------		280,206
	338,252		606,903		81,976		256,490		-----------		322,202
	47,500		127,500		25,500		16,000		-----------		48,250
	570		1,530		306		192		-----------		579
	5,360		12,312		3,296		1,032		-----------		5,721
	300		500		100		50		-----------		465
2	$3,932,249	12	$14,675,461	7	$6,048,858		-----------		-----------	8	$19,157,842
	113,719		189,402		68,286		-----------		-----------		800,137
	182,375		514,862		120,213		-----------		-----------		2,045,173
	364,750		1,025,282		167,650		-----------		-----------		2,335,814
	35,500		325,000		126,000		-----------		-----------		638,250
	426		3,900		1,512		-----------		-----------		7,659
	19,319		29,182		4,375		-----------		-----------		169,943
	175		455		1,155		-----------		-----------		1,475
	-----------	8	-----------	2	-----------		-----------	1	-----------	2	-----------
	-----------		$1,435		-----------		-----------		-----------		-----------
	-----------		10,300		-----------		-----------		$1,150		-----------
	-----------		7,500		1,500		-----------		750		$1,750
	-----------		90		18		-----------		9		21
	-----------		-----------		-----------		-----------		-----------		-----------
	-----------		135		40		-----------		10		95
13	$110,250	130	$620,000	21	$168,250	5	$19,250	7	$6,750	23	$703,250
	1,323		7,440		2.019		231		81		8,439
7	$466,241	40	$4,443,398	5	$866,157		-----------	3	$28,810	3	$796,469

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 46	No. of corporations	Corporation Class 47	No. of corporations	Corporation Class 48
Total amount paid in for stock	23	$10,393,863	27	$13,859,256	123	$2,520,937
Total debt	23	$1,992,090	27	$3,293,698	123	$958,482
Showing gross receipts not exceeding $10,000	2	$1,402	3	$2,810	20	$110,047
Net profits reported		------------		24		44,067
Assessed value		4,150		------------		30,013
Actual value reported		4,900		------------		37,399
Franchise assessment		2,000		2,750		22,750
Franchise tax		24		33		273
Total tax reported		195		------------		2,287
License tax (levied since 1915)		30		55		435
Showing gross receipts from $10,000 to $20,000		------------		------------	26	$399,375
Net profits reported		------------		------------		17,603
Assessed value		------------		------------		83,420
Actual value reported		------------		------------		124,978
Franchise assessment		------------		------------		31,500
Franchise tax		------------		------------		378
Total tax reported		------------		------------		2,502
License tax (levied since 1915)		------------		------------		365
Showing gross receipts from $20,000 to $50,000	9	$327,299	3	$85,008	43	$1,352,894
Net profits reported		63,606		3,842		56,229
Assessed value		61,420		2,340		95,967
Actual value reported		117,084		4,549		232,975
Franchise assessment		38,500		4,000		71,750
Franchise tax		462		48		861
Total tax reported		2,013		198		7,144
License tax (levied 1915)		1,245		40		905
Showing gross receipts from $50,000 to $150,000	5	$412,445	6	$489,550	21	$1,678,619
Net profits reported		148,768		18,745		74,053
Assessed value		3,500		34,453		133,265
Actual value reported		65,125		45,019		283,997
Franchise assessment		57,000		17,500		62,250
Franchise tax		684		210		747
Total tax reported		2,837		1,942		7,797
License tax (levied since 1915)		140		185		600
Showing gross receipts from $150,000 to $500,000	2	$515,868	1	$323,468	5	$987,768
Net profits reported		115,077		13,381		51,948
Assessed value		71,943		------------		40,755
Actual value reported		93,626		18,500		313,639
Franchise assessment		65,000		2,500		34,000
Franchise tax		780		30		408
Total tax reported		3,118		126		3,050
License tax (levied since 1915)		125		50		175
Showing gross receipts exceeding $500,000	1	$998,812	12	$28,824,532		------------
Net profits reported		53,442		2,607,877		------------
Assessed value		99,400		1,399,115		------------
Actual value reported		------------		2,789,619		------------
Franchise assessment		50,000		897,000		------------
Franchise tax		600		10,764		------------
Total tax reported		5,550		107,705		------------
License tax (levied since 1915)		100		1,435		------------
Inoperative corporations	4	------------	2	------------	8	------------
Assessed value		$1,995		$13,000		------------
Actual value reported		3,000		------------		------------
Franchise assessment		8,500		6,000		$5,750
Franchise tax		102		72		69
Total tax reported		------------		------------		33
License tax (levied since 1915)		100		35		105
Total franchise assessment	23	$221,000	27	$929,750	123	$228,000
Total franchise tax		2,652		11,157		2,736
Gross receipts of corporations reporting no profits	5	$103,637	7	$1,043,864	33	$1,254,881

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 49	No. of corporations	Corporation Class 50	No. of corporations	Corporation Class 51	No. of corporations	Corporation Class 52	No. of corporations	Corporation Class 53	No. of corporations	Corporation Class 54
48	$9,429,107	224	$13,402,522	23	$478,428	16	$565,555	49	$1,096,519	34	$2,532,607
48	$6,395,712	224	$8,789,370	23	$231,191	16	$691,173	49	$2,183,433	34	$1,553,432
2	$7,738	18	$101,557	6	$36,485	0	------------	7	$30,129	10	$54,482
	572		2,566		2,453		------------		5,915		3,671
	------------		31,320		6,070		------------		1,701		255
	------------		66,533		30,440		------------		11,897		90,577
	2,000		21,750		6,250		------------		7,250		10,750
	24		261		75		------------		87		129
	11		5,069		135		------------		93		244
	30		225		70		------------		250		315
1	$19,461	13	$199,638	8	$120,856	2	$35,165	9	$139,571	4	$51,517
	------------		5,070		3,256		221		2,003		1,225
	------------		18,528		15,585		5,820		8,410		375
	------------		38,738		34,015		------------		4,820		24,383
	1,000		18,000		9,500		3,500		9,000		5,000
	12		216		114		42		108		60
	10		1,058		971		293		1,508		245
	15		165		110		40		150		170
7	$272,506	49	$1,576,150	3	$92,289	4	$140,496	11	$399,555	4	$107,898
	11,357		44,073		4,294		6,463		9,324		7,018
	16,926		205,813		2,375		13,448		13,212		670
	37,962		408,710		3,224		26,258		33,845		7,332
	12,250		77,250		5,750		6,750		18,000		6,750
	147		927		69		81		216		81
	848		6,496		470		2,310		1,106		564
	140		975		55		100		180		160
10	$954,303	72	$6,301,391	1	$81,694	5	$482,896	10	$901,664	8	$682,952
	20,663		435,956		------------		2,153		12,542		35,071
	84,310		620,423		20,420		39,860		211,620		210,096
	161,913		999,709		28,000		36,900		86,050		321,971
	47,000		254,000		1,250		14,250		24,000		52,000
	564		3,048		15		171		288		624
	2,996		31,357		248		1,470		3,572		7,360
	325		1,405		10		105		210		310
14	$1,054,806	41	$11,590,145	3	$831,918	4	$908,044	5	$1,304,960	1	$157,745
	179,865		437,106		46,025		27,024		25,000		617
	308,330		2,041,090		113,540		61,419		12,030		2,931
	226,270		2,879,670		292,325		55,600		10,000		------------
	154,000		488,500		33,500		25,000		32,000		6,500
	1,848		5,862		402		300		384		78
	18,416		97,300		5,293		2,733		1,603		257
	1,025		1,430		145		100		105		20
14	$19,273,072	18	$23,885,092		------------	1	$1,675,079	2	$5,142,094	0	------------
	418,694		2,069,798		------------		------------		183,581		------------
	1,426,802		2,754,885		------------		78,961		449,734		------------
	1,699,677		4,780,183		------------		205,405		702,534		------------
	604,250		811,500		------------		42,000		205,500		------------
	7,251		9,738		------------		504		2,466		------------
	62,001		113,695		------------		4,336		16,285		------------
	735		1,905		------------		75		75		------------
	------------	13	------------	2	------------	0	------------	5	------------	7	------------
	------------		$3,500		$15,645		------------		$5,725		$748
	------------		18,228		500		------------		------------		285
	------------		10,250		1,750		------------		7,250		6,000
	------------		123		21		------------		87		72
	------------		------------		------------		------------		------------		15
	------------		190		45		------------		105		215
48	$820,500	224	$1,681,250	23	$58,000	16	$91,500	49	$303,000	34	$87,000
	9,846		20,175		696		1,098		3,636		1,044
16	$3,479,384	73	$6,712,192	7	$172,831	7	$2,060,192	27	$1,920,401	12	$333,875

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Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 55	No. of corporations	Corporation Class 56	No. of corporations	Corporation Class 57
Total amount paid in for stock	15	$198,596	23	$629,777	574	$70,843,051
Total debt	15	$36,527	23	$299,533	574	$27,415,073
Showing gross receipts not exceeding $10,000	6	$28,954	13	$21,735	200	$1,005,705
Net profits reported		502		1,879		164,742
Assessed value		2,793		84,5[illegible]5		4,674,571
Actual value reported		6,100		216,395		9,345,016
Franchise assessment		5,500		12,750		468,750
Franchise tax		66		153		5,625
Total tax reported		71		1,851		102,892
License tax (levied since 1915)		65		300		9,310
Showing gross receipts from $10,000 to $20,000	3	$53,818		------------	69	$974,492
Net profits reported		4,539		------------		174,388
Assessed value		5,630		------------		3,721,062
Actual value reported		11,220		------------		6,435,115
Franchise assessment		3,750		------------		313,750
Franchise tax		45		------------		3,765
Total tax reported		208		------------		107,556
License tax (levied since 1915)		50		------------		3,440
Showing gross receipts from $20,000 to $50,000	3	$121,765	1	$26,222	61	$1,909,630
Net profits reported		8,125		199		257,893
Assessed value		------------		------------		5,464,648
Actual value reported		17,162		------------		8,342,217
Franchise assessment		7,000		4,500		450,250
Franchise tax		84		54		5,403
Total tax reported		438		------------		186,953
License tax (levied since 1915)		60		75		2,340
Showing gross receipts from $50,000 to $150,000	3	$239,334		------------	31	$2,657,661
Net profits reported		37,685		------------		397,228
Assessed value		20,100		------------		4,947,677
Actual value reported		22,948		------------		4,001,913
Franchise assessment		9,750		------------		478,750
Franchise tax		117		------------		5,745
Total tax reported		723		------------		124,207
License tax (levied since 1915)		60		------------		1,625
Showing gross receipts from $150,000 to $500,000		------------		------------	11	$3,577,380
Net profits reported		------------		------------		669,260
Assessed value		------------		------------		2,156,153
Actual value reported		------------		------------		5,673,701
Franchise assessment		------------		------------		534,000
Franchise tax		------------		------------		6,408
Total tax reported		------------		------------		112,863
License tax (levied since 1915)		------------		------------		1,375
Showing gross receipts exceeding $500,000		------------		------------	5	$3,912,209
Net profits reported		------------		------------		814,841
Assessed value		------------		------------		4,500,188
Actual value reported		------------		------------		603,705
Franchise assessment		------------		------------		493,000
Franchise tax		------------		------------		5,916
Total tax reported		------------		------------		127,368
License tax (levied since 1915)		------------		------------		600
Inoperative corporations	0	------------	9	------------	97	------------
Assessed value		------------		$11,930		$584,093
Actual value reported		------------		119,500		1,853,328
Franchise assessment		------------		7,750		123,250
Franchise tax		------------		93		1,479
Total tax reported		------------		429		7,399
License tax (levied since 1915)		------------		235		4,155
Total franchise assessment	15	$26,000	23	$25,000	574	$2,861,750
Total franchise tax		312		300		34,341
Gross receipts of corporations reporting no profits	4	$16,680	9	$17,381	237	$3,449,076

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 58	No. of corporations	Corporation Class 59	No. of corporations	Corporation Class 60	No. of corporations	Corporation Class 61	No. of corporations	Corporation Class 62	No. of corporations	Corporation Class 63
7	$134,532	18	$249,294	22	$16,310,465	4	$1,893,200	5	$50,030	130	$5,481,960
7	$47,942	18	$93,431	22	$10,312,317	4	$130,795	5	$31,194	130	$5,060,231
3	$10,635	4	$13,436	1	$1,468	0	------------	1	$1,854	23	$67,575
	1,740		785		932		------------		------------		9,582
	2,000		175		------------		------------		------------		98,050
	------------		475		------------		------------		------------		154,747
	3,000		4,000		1,000		------------		1,000		27,250
	36		48		12		------------		12		327
	92		------------		------------		------------		------------		2,599
	60		45		15		------------		20		410
0	------------	3	$43,387	3	$38,403		------------	1	$14,181	9	$132,659
	------------		2,566		16,362		------------		------------		12,015
	------------		1,725		------------		------------		------------		25,455
	------------		3,100		------------		------------		1,500		62,876
	------------		5,750		9,750		------------		1,000		12,750
	------------		69		117		------------		12		153
	------------		80		529		------------		------------		702
	------------		50		110		------------		20		150
1	$29,685	0	------------	4	$139,678	1	$32,605	0	------------	18	$533,765
	978		------------		15,251		------------		------------		59,923
	2,420		------------		62,608		100		------------		245,398
	------------		------------		178,197		------------		------------		389,005
	1,750		------------		18,500		1,000		------------		46,500
	21		------------		222		12		------------		558
	188		------------		1,459		185		------------		6,403
	20		------------		135		10		------------		795
2	$140,932	3	$335,668	1	$60,831	0	------------	1	$94,770	26	$2,359,756
	5,870		36,121		18,839		------------		------------		177,830
	7,405		9,000		------------		------------		------------		332,764
	7,927		10,000		------------		------------		------------		691,109
	2,250		16,000		10,000		------------		1,750		149,500
	27		192		120		------------		21		1,794
	141		308		676		------------		------------		13,812
	40		40		50		------------		10		600
0	------------	2	$850,738	3	$902,221	2	$482,887	0	------------	18	$4,541,444
	------------		78,147		290,617		6,927		------------		319,145
	------------		------------		257,780		5,206		------------		276,998
	------------		4,000		564,700		14,537		------------		628,716
	------------		47,000		132,500		8,000		------------		177,000
	------------		564		1,590		96		------------		2,124
	------------		27		35,159		502		------------		15,262
	------------		30		225		35		------------		1,280
0	------------	1	$565,883	2	$13,630,583	1	$2,393,491	0	------------	9	$16,542,368
	------------		34,099		4,768,375		249,971		------------		284,628
	------------		------------		------------		2,150		------------		912,922
	------------		------------		------------		------------		------------		3,050,542
	------------		14,000		35,000		5,000		------------		312,500
	------------		168		420		60		------------		3,750
	------------		201		486,902		2,460		------------		28,812
	------------		10		1,000		200		------------		520
1	------------	5	------------	8	------------	0	------------	2	------------	27	------------
	------------		------------		$1,200		------------		------------		$50,535
	------------		------------		700		------------		------------		33,517
	$1,000		$3,750		49,750		------------		$2,000		49,500
	12		45		597		------------		24		594
	------------		------------		20		------------		10		10
	75		70		250		------------		70		380
7	$8,000	18	$90,500	22	$256,500	4	$14,000	5	$5,750	130	$775,000
	96		1,086		3,078		168		69		9,300
2	$3,597	3	$117,658	1	$39,319	2	$224,287	3	$110,805	35	$2,440,057

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 64	No. of corporations	Corporation Class 65	No. of corporations	Corporation Class 66
Total amount paid in for stock	200	$672,430	225	$20,044,451	19	$1,009,003
Total debt	200	$4,394,892	225	$5,644,080	19	$906,412
Showing gross receipts not exceeding $10,000	24	$109,872	86	$325,100	1	$3,016
Net profits reported		13,827		49,303		1,147
Assessed value		31,020		961,559		----------
Actual value reported		52,216		2,450,723		15,250
Franchise assessment		23,250		101,750		1,000
Franchise tax		279		1,221		12
Total tax reported		811		62,305		6
License tax (levied since 1915)		335		2,175		20
Showing gross receipts from $10,000 to $20,000	13	$179,023	32	$450,048	1	$17,148
Net profits reported		22,639		54,878		----------
Assessed value		25,515		778,485		----------
Actual value reported		18,375		1,559,631		27,300
Franchise assessment		14,500		65,500		1,250
Franchise tax		174		786		15
Total tax reported		239		22,123		26
License tax (levied since 1915)		130		745		20
Showing gross receipts from $20,000 to $50,000	26	$961,503	34	$1,114,397		----------
Net profits reported		142,776		268,046		----------
Assessed value		98,777		1,282,553		----------
Actual value reported		176,255		2,694,919		----------
Franchise assessment		50,000		154,500		----------
Franchise tax		600		1,854		----------
Total tax reported		1,936		34,681		----------
License tax (levied since 1915)		370		1,170		----------
Showing gross receipts from $50,000 to $150,000	24	$2,138,144	13	$1,003,315	6	$542,146
Net profits reported		444,273		118,448		27,373
Assessed value		67,995		1,222,720		76,718
Actual value reported		198,733		2,004,687		45,140
Franchise assessment		51,750		139,750		18,250
Franchise tax		621		1,677		219
Total tax reported		5,855		26,695		2,969
License tax (levied since 1915)		295		485		130
Showing gross receipts from $150,000 to $500,000	20	$4,780,238	9	$2,169,038	5	$1,219,639
Net profits reported		689,785		185,029		37,048
Assessed value		85,015		983,270		62,945
Actual value reported		198,400		2,728,143		62,346
Franchise assessment		109,750		142,000		44,500
Franchise tax		1,317		1,704		534
Total tax reported		2,930		37,819		4,113
License tax (levied since 1915)		280		470		130
Showing gross receipts exceeding $500,000	5	$7,260,929	3	$7,085,909		----------
Net profits reported		1,712,589		708,227		----------
Assessed value		----------		289,304		----------
Actual value reported		----------		997,334		----------
Franchise assessment		28,000		77,000		----------
Franchise tax		336		924		----------
Total tax reported		526		12,041		----------
License tax (levied since 1915)		65		140		----------
Inoperative corporations	88	----------	48	----------	6	----------
Assessed value		$144,455		$238,135		$1,300
Actual value reported		475,717		721,311		38,772
Franchise assessment		144,000		44,500		5,500
Franchise tax		1,728		534		66
Total tax reported		78		517		10
License tax (levied since 1915)		1,050		1,200		165
Total franchise assessment	200	$421,250	225	$725,000	19	$70,500
Total franchise tax		5,055		8,700		846
Gross receipts of corporations reporting no profits	50	$6,456,283	74	$1,285,079	3	$390,095

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 67	No. of corporations	Corporation Class 68	No. of corporations	Corporation Class 69	No. of corporations	Corporation Class 70	No. of corporations	Corporation Class 71	No. of corporations	Corporation Class 72
30	$2,797,233	11	$62,271	11	$8,371,684	92	$6,980,477	13	$326,300	312	$31,988,979
30	$1,361,003	11	$14,158	11	$2,596,880	92	$4,719,189	13	$304,246	312	$17,501,618
3	$21,056	4	$20,205		-----------	6	$29,034	2	$6,842	30	$119,133
	1,727		614		-----------		1,255		-----------		18,205
	2,185		4,224		-----------		3,470		125		147,806
	3,534		4,997		-----------		479,648		250		219,481
	2,500		3,500		-----------		89,750		1,750		34,500
	30		42		-----------		1,077		21		414
	12		93		-----------		10,032		-----------		3,798
	40		55		-----------		250		30		485
1	$19,154	2	$25,038		-----------	11	$163,411	1	$19,177	29	$426,019
	2,135		1,618		-----------		6,206		-----------		38,660
	2,500		-----------		-----------		16,235		2,000		214,350
	2,500		4,328		-----------		40,197		3,500		135,716
	1,250		2,250		-----------		15,000		1,750		48,000
	15		27		-----------		180		21		576
	85		30		-----------		929		260		5,840
	15		30		-----------		340		20		760
9	$304,685	2	$74,574	2	$63,000	28	$975,532	3	$113,753	75	$2,575,859
	20,161		4,916		117		34,015		5,605		125,067
	301,970		2,200		242,026		128,060		12,050		490,533
	44,415		7,500		22,339		332,500		5,930		1,035,623
	29,500		3,500		3,000		66,250		13,500		125,500
	354		42		36		795		162		1,506
	7,597		60		208		9,059		1,692		21,799
	265		30		35		555		65		1,540
9	$734,679	0	-----------	4	$389,069	20	$1,734,800	2	$191,047	109	$9,843,628
	33,219		-----------		17,346		45,662		6,324		499,256
	95,378		-----------		18,470		397,253		23,822		1,244,268
	135,016		-----------		45,336		460,034		46,831		2,618,700
	31,000		-----------		21,000		128,250		5,500		359,750
	372		-----------		252		1,539		66		4,317
	5,656		-----------		3,312		21,715		343		50,824
	180		-----------		295		450		45		2,390
4	$796,847	0	-----------	3	$1,043,284	17	$4,696,768	3	$600,049	41	$10,203,695
	29,248		-----------		4,460		59,315		7,034		409,027
	91,284		-----------		119,846		962,315		53,808		1,774,211
	142,000		-----------		215,469		1,134,270		106,998		3,030,118
	23,500		-----------		31,000		149,750		11,000		357,000
	282		-----------		372		1,797		132		4,284
	4,275		-----------		5,262		25,245		770		56,174
	80		-----------		145		610		245		1,450
1	$2,288,005	0	-----------	1	$2,748,906	7	$8,482,442	0	-----------	11	$36,474,915
	41,333		-----------		58,754		274,989		-----------		530,556
	166,241		-----------		7,663		1,409,420		-----------		1,466,412
	-----------		-----------		712,281		1,568,895		-----------		2,820,901
	100,000		-----------		102,000		223,250		-----------		435,750
	1,200		-----------		1,224		2,679		-----------		5,229
	42,690		-----------		6,264		46,525		-----------		137,034
	200		-----------		800		275		-----------		640
3	-----------	3	-----------	1	-----------	3	-----------	2	-----------	17	-----------
	$1,800		$1,000		-----------		-----------		-----------		$28,956
	5,400		1,200		-----------		-----------		-----------		112,266
	2,500		1,750		$750		$2,750		$5,000		33,500
	30		21		9		33		60		402
	83		18		-----------		72		199		64
	80		50		10		80		30		1,295
30	$190,250	11	$11,000	11	$157,750	92	$675,000	13	$38,500	312	$1,394,000
	2,283		132		1,893		8,100		462		16,728
4	$193,205	2	$7,414	6	$937,777	36	$4,870,506	7	$563,304	57	$3,918,282

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 73	No. of corporations	Corporation Class 74	No. of corporations	Corporation Class 75
Total amount paid in for stock	67	$9,375,884	113	$2,138,098	34	$7,900,873
Total debt	67	$8,693,466	113	$1,608,893	34	$9,092,703
Showing gross receipts not exceeding $10,000	3	$13,823	6	$40,351	3	$18,095
Net profits reported		778		3,030		2,391
Assessed value		34,165		6,820		----------
Actual value reported		80,200		7,970		----------
Franchise assessment		4,000		7,500		3,000
Franchise tax		48		90		36
Total tax reported		378		120		78
License tax (levied since 1915)		70		155		40
Showing gross receipts from $10,000 to $20,000	0	----------	8	$116,251	0	----------
Net profits reported		----------		5,746		----------
Assessed value		----------		9,273		----------
Actual value reported		----------		59,080		----------
Franchise assessment		----------		9,750		----------
Franchise tax		----------		117		----------
Total tax reported		----------		670		----------
License tax (levied since 1915)		----------		145		----------
Showing gross receipts from $20,000 to $50,000	3	$128,917	25	$890,443	2	$46,701
Net profits reported		38,845		18,628		818
Assessed value		11,575		74,955		11,718
Actual value reported		----------		124,451		561,050
Franchise assessment		10,250		35,750		2,000
Franchise tax		123		429		24
Total tax reported		773		5,918		701
License tax (levied since 1915)		65		610		40
Showing gross receipts from $50,000 to $150,000	12	$1,141,572	48	$4,093,507	7	$551,321
Net profits reported		111,040		105,431		9,574
Assessed value		353,758		409,275		53,536
Actual value reported		653,338		419,707		102,075
Franchise assessment		140,500		112,500		22,000
Franchise tax		1,686		1,350		264
Total tax reported		9,950		11,915		3,480
License tax (levied since 1915)		385		980		155
Showing gross receipts from $150,000 to $500,000	19	$5,648,944	16	$4,442,399	7	$1,788,523
Net profits reported		137,159		70,846		98,242
Assessed value		395,529		118,594		373,425
Actual value reported		661,920		764,550		520,232
Franchise assessment		181,000		82,000		103,000
Franchise tax		2,172		984		1,236
Total tax reported		27,025		9,101		9,474
License tax (levied since 1915)		385		410		350
Showing gross receipts exceeding $500,000	28	$63,438,704	5	$5,675,863	12	$32,374,207
Net profits reported		1,402,074		138,130		67,907
Assessed value		2,917,837		339,320		2,890,530
Actual value reported		4,729,830		764,550		4,709,328
Franchise assessment		1,227,250		120,000		735,750
Franchise tax		14,727		1,440		8,829
Total tax reported		129,523		8,093		159,565
License tax (levied since 1915)		2,910		135		1,135
Inoperative corporations	2	----------	5	----------	3	----------
Assessed value		----------		----------		$23,505
Actual value reported		----------		$4,000		23,505
Franchise assessment		$1,000		4,250		5,750
Franchise tax		12		51		69
Total tax reported		----------		224		602
License tax (levied since 1915)		20		50		225
Total franchise assessment	67	$1,564,000	113	$371,750	34	$871,500
Total franchise tax		18,768		4,461		10,458
Gross receipts of corporations reporting no profits	10	$1,887,099	25	$3,100,391	15	$28,359,337

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 76	No. of corporations	Corporation Class 77	No. of corporations	Corporation Class 78	No. of corporations	Corporation Class 79	No. of corporations	Corporation Class 80	No. of corporations	Corporation Class 81
179	$6,535,746	7	$221,286	4	$10,550	45	$2,443,495	12	$496,533	12	$867,224
179	$1,961,908	7	$137,289	4	$150	45	$3,151,017	12	$836,516	12	$488,594
17	$75,633	3	$21,626	1	$4,500	2	$8,748	3	$14,063	1	$1,100
	10,816		622		344		2,879		-----		-----
	145,349		2,195		1,000		2,850		-----		100
	229,405		1,235		1,200		5,300		150		100
	21,750		3,500		1,000		2,500		3,000		1,000
	261		42		12		30		36		12
	3,150		142		38		146		25		-----
	365		40		10		45		40		15
25	$369,737	0	-----	2	$26,056	4	$66,737	1	$12,353	2	$34,134
	20,875		-----		6,090		5,046		-----		800
	120,027		-----		-----		27,200		3,998		168,865
	256,051		-----		10,525		76,732		3,996		15,000
	29,750		-----		3,000		9,250		1,000		5,500
	357		-----		36		111		12		66
	4,343		-----		28		868		102		5,837
	375		-----		20		75		20		70
65	$2,341,716	2	$49,746	0	-----	9	$350,619	1	$20,693	4	$149,589
	57,739		4,847		-----		17,396		-----		12,830
	413,244		9,940		-----		100,310		-----		30,926
	712,712		2,000		-----		110,150		-----		5,948
	110,750		5,750		-----		25,250		1,250		9,750
	1,329		69		-----		303		15		117
	17,564		583		-----		1,618		747		479
	1,320		40		-----		175		25		80
45	$3,687,527	0	-----	0	-----	12	$1,306,143	3	$309,426	4	$403,568
	149,830		-----		-----		17,749		10,071		64,553
	552,656		-----		-----		123,890		21,197		51,400
	953,958		-----		-----		303,779		39,400		54,013
	145,750		-----		-----		36,250		7,000		58,500
	1,749		-----		-----		435		84		702
	23,531		-----		-----		5,502		308		3,757
	930		-----		-----		280		135		125
16	$3,933,377	2	$589,859	0	-----	10	$2,520,587	0	-----	1	$225,850
	114,093		3,244		-----		35,982		-----		2,563
	701,392		21,720		-----		110,351		-----		9,225
	1,626,108		43,440		-----		292,546		-----		9,225
	126,500		16,000		-----		55,500		-----		5,000
	1,518		192		-----		666		-----		60
	22,365		1,414		-----		4,709		-----		378
	565		100		-----		200		-----		25
2	$3,120,225	0	-----	0	-----	7	$10,088,460	0	-----	0	-----
	121,127		-----		-----		139,809		-----		-----
	751,430		-----		-----		754,081		-----		-----
	1,704,534		-----		-----		226,175		-----		-----
	156,000		-----		-----		206,250		-----		-----
	1,872		-----		-----		2,475		-----		-----
	25,726		-----		-----		25,376		-----		-----
	110		-----		-----		325		-----		-----
9	-----	0	-----	1	-----	1	-----	4	-----	0	-----
	-----		-----		-----		-----		$600		-----
	-----		-----		-----		$3,000		20,010		-----
	$8,000		-----		$750		1,000		6,250		-----
	96		-----		9		12		75		-----
	615		-----		-----		-----		10		-----
	130		-----		15		50		90		-----
179	$598,500	7	$25,250	4	$4,750	45	$336,000	12	$18,500	12	$79,750
	7,182		303		57		4,632		222		957
58	$3,041,669	3	$213,114		-----	14	$5,834,758	6	$167,092	4	$147,978

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 82	No. of corporations	Corporation Class 83	No. of corporations	Corporation Class 84
Total amount paid in for stock	82	$37,504,326	3	$850,000	108	$3,231,742
Total debt	82	$12,224,343	3	$117,000	108	$1,611,823
Showing gross receipts not exceeding $10,000	29	$92,068	0	------------	32	$125,819
Net profits reported		30,793		------------		10,271
Assessed value		69,879		------------		40,515
Actual value reported		93,100		------------		84,338
Franchise assessment		46,750		------------		29,500
Franchise tax		561		------------		354
Total tax reported		6,269		------------		1,855
License tax (levied since 1915)		1,370		------------		645
Showing gross receipts from $10,000 to $20,000	4	$64,396	0	------------	26	$385,487
Net profits reported		24,960		------------		20,078
Assessed value		432,150		------------		138,472
Actual value reported		956,000		------------		371,985
Franchise assessment		24,500		------------		27,750
Franchise tax		294		------------		333
Total tax reported		346		------------		4,721
License tax (levied since 1915)		140		------------		540
Showing gross receipts from $20,000 to $50,000	3	$89,932	0	------------	18	$573,090
Net profits reported		6,505		------------		59,596
Assessed value		75,400		------------		223,135
Actual value reported		250,000		------------		179,403
Franchise assessment		3,250		------------		27,500
Franchise tax		39		------------		330
Total tax reported		3,208		------------		8,367
License tax (levied since 1915)		325		------------		390
Showing gross receipts from $50,000 to $150,000	3	$246,126	1	$93,447	10	$860,399
Net profits reported		216,344		29,285		41,174
Assessed value		118,993		32,835		505,405
Actual value reported		240,666		------------		904,489
Franchise assessment		23,750		15,000		33,250
Franchise tax		285		180		399
Total tax reported		12,033		948		11,880
License tax (levied since 1915)		200		50		440
Showing gross receipts from $150,000 to $500,000	2	$414,620	0	------------	5	$989,874
Net profits reported		94,709		------------		67,131
Assessed value		497,596		------------		601,960
Actual value reported		995,192		------------		773,050
Franchise assessment		221,000		------------		52,500
Franchise tax		2,652		------------		630
Total tax reported		2,702		------------		17,197
License tax (levied since 1915)		1,200		------------		235
Showing gross receipts exceeding $500,000	2	$2,361,253	1	$947,334	0	------------
Net profits reported		1,692,056		53,443		------------
Assessed value		1,808,315		121,345		------------
Actual value reported		1,977,413		274,000		------------
Franchise assessment		227,000		75,000		------------
Franchise tax		2,724		900		------------
Total tax reported		95,150		3,705		------------
License tax (levied since 1915)		1,100		75		------------
Inoperative corporations	39	------------	1	------------	17	------------
Assessed value		$230,300		$103,500		$21,810
Actual value reported		4,925		103,500		27,840
Franchise assessment		163,500		750		14,000
Franchise tax		1,962		9		168
Total tax reported		3,709		------------		264
License tax (levied since 1915)		4,660		50		235
Total franchise assessment	82	$709,750	3	$90,750	108	$184,500
Total franchise tax		8,517		1,089		2,214
Gross receipts of corporations reporting no profits	16	$246,837	0	------------	33	$777,040

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 85	No. of corporations	Corporation Class 86	No. of corporations	Corporation Class 87	No. of corporations	Corporation Class 88	No. of corporations	Corporation Class 89	No. of corporations	Corporation Class 90
221	$24,175,590	39	$3,462,603	77	$3,964,529	63	$2,062,630	47	$1,703,262	152	$140,917,918
221	$17,733,452	39	$933,779	77	$2,300,402	63	$834,334	47	$582,039	152	$83,182,553
68	$257,160	7	$44,292	32	$75,243	25	$112,436	29	$110,630	72	$224,008
	23,254		1,657		24,767		15,665		27,566		113,676
	726,292		3,778		37,923		7,080		101,389		170,639
	1,791,388		5,000		92,591		11,156		194,844		563,026
	80,750		8,750		35,750		40,500		43,000		119,000
	969		105		429		486		516		1,428
	24,843		175		1,289		1,487		2,682		19,625
	2,515		90		725		650		900		3,220
25	$377,459	2	$32,621	5	$69,751	10	$119,078	6	$89,444	15	$220,979
	20,548		5,393		20,661		11,407		38,366		61,517
	153,711		802		4,750		13,023		25,796		72,523
	342,120		90		15,500		25,051		3,857		294,129
	31,750		5,000		15,500		12,500		19,250		37,000
	381		60		186		150		231		444
	6,549		320		1,434		616		1,183		785
	495		50		215		180		125		1,870
43	$1,377,604	7	$235,297	6	$217,532	10	$323,523	2	$81,673	13	$420,264
	35,257		30,039		115,573		28,599		41,612		106,891
	854,503		6,370		23,538		26,471		113,505		71,387
	2,892,701		11,600		10,775		39,339		277,251		309,914
	84,750		20,000		51,500		28,750		22,500		73,750
	1,017		240		618		345		270		885
	33,024		576		2,553		1,191		4,128		1,343
	1,830		325		470		570		150		970
34	$2,726,471	5	$418,245	2	$219,658	6	$449,920	1	$69,745	3	$238,337
	73,682		66,878		-----------		70,130		3,562		146,042
	1,318,008		15,805		613		5,428		140,950		-----------
	1,534,071		87,119		500		5,963		166,600		-----------
	107,750		39,500		15,500		25,500		20,000		38,250
	1,293		474		186		306		240		459
	33,236		719		280		3,974		4,271		2,187
	1,885		95		100		175		10		325
16	$3,702,944	7	$1,973,031	1	$215,600	1	$173,524	0	-----------	3	$550,499
	151,003		61,437		44,225		12,727		-----------		41,369
	2,736,645		136,262		100,360		1,916		-----------		61,456
	5,300,246		74,650		139,100		1,916		-----------		44,800
	266,250		67,750		25,000		5,000		-----------		73,500
	3,195		813		300		60		-----------		882
	91,354		4,911		5,340		48		-----------		3,022
	1,255		270		100		25		-----------		525
4	$4,510,115	6	$9,676,896	0	-----------	0	-----------	0	-----------	4	$14,672,629
	407		234,117		-----------		-----------		-----------		23,272
	4,868,644		127,149		-----------		-----------		-----------		65,564
	6,030,840		235,232		-----------		-----------		-----------		6,353
	432,000		128,000		-----------		-----------		-----------		323,500
	5,184		1,536		-----------		-----------		-----------		3,882
	93,230		7,745		-----------		-----------		-----------		1,202
	725		225		-----------		-----------		-----------		675
31	-----------	5	-----------	31	-----------	11	-----------	9	-----------	42	-----------
	$39,050		-----------		-----------		$3,550		-----------		$100
	108,985		-----------		$1,500		30,539		-----------		19,675
	33,750		$3,250		30,500		16,500		$8,000		112,250
	405		39		366		198		96		1,347
	3,599		-----------		96		1,172		20		8,399
	2,030		65		595		260		405		2,890
221	$1,037,000	39	$272,250	77	$173,750	63	$128,750	47	$112,750	152	$777,250
	12,444		3,267		2,085		1,545		1,353		9,327
109	$8,453,918	9	$617,049	15	$301,713	120	$385,127	9	$29,320	33	$13,598,333

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 91	No. of corporations	Corporation Class 92	No. of corporations	Corporation Class 93
Total amount paid in for stock	60	$4,830,254	9	$1,072,000	23	$1,281,628
Total debt	60	$2,021,232	9	$487,924	23	$1,189,843
Showing gross receipts not exceeding $10,000	16	$91,955	1	$3,976	1	$5,583
Net profits reported		11,159		1,413		------
Assessed value		616,250		------		------
Actual value reported		1,513,210		425		1,000
Franchise assessment		28,000		750		1,000
Franchise tax		336		9		12
Total tax reported		14,627		------		50
License tax (levied since 1915)		520		10		15
Showing gross receipts from $10,000 to $20,000	16	$218,660	1	$20,000	3	$42,186
Net profits reported		40,607		755		1,414
Assessed value		260,390		------		2,400
Actual value reported		234,000		400		2,400
Franchise assessment		25,000		1,250		3,500
Franchise tax		300		15		42
Total tax reported		16,637		5		138
License tax (levied since 1915)		425		20		50
Showing gross receipts from $20,000 to $50,000	13	$437,587	1	$49,725	6	$180,491
Net profits reported		73,225		22,894		5,894
Assessed value		366,900		32,170		29,557
Actual value reported		400,502		50,000		44,354
Franchise assessment		52,750		2,000		10,750
Franchise tax		633		24		129
Total tax reported		48,840		960		889
License tax (levied since 1915)		450		25		115
Showing gross receipts from $50,000 to $150,000	7	$541,505	3	$232,017	7	$578,681
Net profits reported		77,132		------		20,819
Assessed value		75,590		79,010		66,229
Actual value reported		50		110,310		153,198
Franchise assessment		57,500		11,250		14,250
Franchise tax		690		135		171
Total tax reported		49,912		2,773		2,891
License tax (levied since 1915)		175		185		135
Showing gross receipts from $150,000 to $500,000	1	$151,813	0	------	4	$901,568
Net profits reported		------		------		12,702
Assessed value		455,590		------		203,275
Actual value reported		60,000		------		204,730
Franchise assessment		20,000		------		31,000
Franchise tax		240		------		372
Total tax reported		16,634		------		6,155
License tax (levied since 1915)		100		------		70
Showing gross receipts exceeding $500,000	0	------	0	------	2	$1,400,639
Net profits reported		------		------		42,601
Assessed value		------		------		179,400
Actual value reported		------		------		153,672
Franchise assessment		------		------		31,500
Franchise tax		------		------		378
Total tax reported		------		------		8,254
License tax (levied since 1915)		------		------		85
Inoperative corporations	7	------	3	------	0	------
Assessed value		$35,150		------		------
Actual value reported		7,000		$207,539		------
Franchise assessment		8,000		5,000		------
Franchise tax		96		60		------
Total tax reported		1,443		------		------
License tax (levied since 1915)		150		135		------
Total franchise assessment	60	$191,250	9	$20,250	23	$92,000
Total franchise tax		2,295		243		1,104
Gross receipts of corporations reporting no profits	19	$428,342	1	$49,725	9	$1,297,146

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 94	No. of corporations	Corporation Class 95	No. of corporations	Corporation Class 96	No. of corporations	Corporation Class 97	No. of corporations	Corporation Class 98	No. of corporations	Corporation Class 99
45	$3,661,045	5	$334,680	127	$4,374,939	109	$7,300,915	86	$1,626,472	16	$1,003,227
45	$3,465,970	5	$57,154	127	$1,093,064	109	$3,434,190	86	$577,439	16	$430,713
7	$51,062	3	$10,977	9	$41,176	5	$29,761	11	$54,317	1	$5,302
	2,155		25		9,270		369		7,159		----------
	12,350		3,530		9,430		150		7,650		----------
	38,050		25,180		18,150		150		23,140		9,009
	6,500		5,000		8,750		5,000		10,500		750
	78		60		105		60		126		9
	333		45		1,990		381		699		----------
	90		85		140		100		160		20
6	$82,903	0	----------	8	$116,505	8	$118,370	15	$232,095	0	----------
	802		----------		1,547		2,687		12,104		----------
	18,630		----------		19,530		17,511		10,847		----------
	34,530		----------		26,781		45,881		18,400		----------
	6,750		----------		8,500		9,250		20,750		----------
	81		----------		102		111		249		----------
	542		----------		763		2,175		2,197		----------
	85		----------		110		120		200		----------
7	$218,406	1	$36,182	40	$1,349,995	21	$742,255	33	$1,066,558	2	$60,520
	6,748		----------		62,699		67,325		56,899		----------
	56,200		1,250		158,383		52,641		84,794		4,350
	222,856		1,250		312,611		76,463		92,719		19,600
	17,000		1,000		66,250		53,250		67,750		3,000
	204		12		795		639		813		36
	2,230		75		9,103		9,969		10,461		155
	130		20		965		355		520		30
16	$1,450,263	0	----------	44	$3,739,877	33	$2,821,688	19	$1,555,758	4	$332,546
	31,511		----------		227,324		67,658		40,786		11,961
	364,840		----------		689,191		241,947		104,362		15,413
	614,498		----------		1,089,375		248,626		127,623		8,000
	68,000		----------		182,500		114,000		65,000		10,750
	816		----------		2,190		1,368		780		129
	15,604		----------		24,200		32,674		12,961		749
	1,080		----------		1,205		875		320		55
4	$1,230,271	0	----------	14	$3,250,324	23	$5,894,977	1	$202,224	4	$1,230,772
	22,620		----------		166,144		156,534		----------		37,902
	229,078		----------		527,923		609,593		57,175		167,918
	701,414		----------		689,323		442,736		161,144		392,829
	44,500		----------		142,500		267,750		13,000		37,500
	534		----------		1,710		3,213		156		450
	8,107		----------		19,585		40,915		7,801		6,999
	185		----------		365		980		25		135
3	$3,718,796	0	----------	1	$596,431	11	$8,907,808	0	----------	1	$948,654
	32,907		----------		51,922		583,896		----------		61,580
	738,453		----------		93,445		503,517		----------		71,200
	1,002,263		----------		161,141		629,936		----------		110,000
	88,000		----------		75,000		435,500		----------		37,000
	1,056		----------		900		5,226		----------		444
	20,856		----------		3,267		29,841		----------		2,406
	190		----------		1,000		735		----------		25
2	----------	1	----------	11	----------	8	----------	7	----------	4	----------
	----------		----------		----------		----------		$2,050		----------
	----------		----------		----------		----------		5,800		----------
	$1,750		$500		$15,500		$8,750		5,250		$3,000
	21		6		186		105		63		36
	----------		----------		1,232		----------		20		----------
	30		20		1,160		165		85		50
45	$232,500	5	$6,500	127	$499,000	109	$893,500	86	$182,250	16	$92,000
	2,790		78		5,988		10,722		2,187		1,104
21	$4,063,666	3	$43,575	25	$1,755,979	33	$2,986,293	23	$760,504	4	$170,708

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 100	No. of corporations	Corporation Class 101	No. of corporations	Corporation Class 102
Total amount paid in for stock	12	$392,499	251	$83,725,189	245	$12,412,552
Total debt	12	$53,061	251	$66,908,565	245	$9,420,155
Showing gross receipts not exceeding $10,000	5	$20,159	38	$103,280	26	$114,129
Net profits reported		1,657		9,823		11,537
Assessed value		11,515		5,690,026		435,352
Actual value reported		25,500		8,128,414		188,868
Franchise assessment		5,750		611,250		29,250
Franchise tax		60		7,335		351
Total tax reported		157		217,859		4,957
License tax (levied since 1915)		65		2,625		670
Showing gross receipts from $10,000 to $20,000	1	$19,776	7	$107,732	25	$372,970
Net profits reported		-----------		13,651		43,529
Assessed value		2,000		13,405		200,035
Actual value reported		-----------		51,089		387,713
Franchise assessment		1,750		13,000		46,750
Franchise tax		21		156		561
Total tax reported		42		6,504		4,470
License tax (levied since 1915)		10		200		700
Showing gross receipts from $20,000 to $50,000	1	$25,000	24	$860,347	59	$1,989,293
Net profits reported		1,000		119,714		106,627
Assessed value		-----------		1,456,540		314,403
Actual value reported		-----------		642,911		634,871
Franchise assessment		1,500		160,250		112,750
Franchise tax		18		1,923		1,353
Total tax reported		130		32,885		13,808
License tax (levied since 1915)		10		725		1,325
Showing gross receipts from $50,000 to $150,000	2	$195,097	48	$4,438,572	76	$6,665,030
Net profits reported		-----------		232,443		279,527
Assessed value		19,855		1,881,641		980,133
Actual value reported		49,015		2,913,870		1,415,878
Franchise assessment		9,000		424,000		252,000
Franchise tax		108		5,088		3,024
Total tax reported		6,061		90,742		39,526
License tax (levied since 1915)		70		1,390		1,685
Showing gross receipts from $150,000 to $500,000	1	$295,281	55	$15,586,185	39	$9,774,910
Net profits reported		4,415		815,140		546,394
Assessed value		34,975		5,793,078		2,598,249
Actual value reported		-----------		10,391,755		4,844,789
Franchise assessment		7,500		1,308,000		570,500
Franchise tax		90		15,696		6,846
Total tax reported		1,880		204,441		99,379
License tax (levied since 1915)		50		3,405		1,520
Showing gross receipts exceeding $500,000	0	-----------	37	$39,836,167	4	$5,331,627
Net profits reported		-----------		885,422		178,208
Assessed value		-----------		23,285,459		1,205,224
Actual value reported		-----------		32,423,649		1,839,978
Franchise assessment		-----------		3,324,000		350,000
Franchise tax		-----------		39,888		4,200
Total tax reported		-----------		886,020		30,237
License tax (levied since 1915)		-----------		4,340		245
Inoperative corporations	2	-----------	42	-----------	16	-----------
Assessed value		-----------		$1,982,370		$1,490
Actual value reported		-----------		2,011,590		2,980
Franchise assessment		$1,750		403,250		16,000
Franchise tax		21		4,839		192
Total tax reported		-----------		41,382		10
License tax (levied since 1915)		30		1,950		305
Total franchise assessment	12	$27,250	251	$6,243,750	245	$1,377,250
Total franchise tax		327		74,925		16,527
Gross receipts of corporations reporting no profits	5	$219,513	91	$21,705,236	76	$8,991,130

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 103	No. of corporations	Corporation Class 104	No. of corporations	Corporation Class 105	No. of corporations	Corporation Class 106	No. of corporations	Corporation Class 107	No. of corporations	Corporation Class 108
43	$3,462,678	34	$511,107	9	$183,392	5	$769,700	28	$19,565,897	25	$1,616,067
43	$3,075,957	34	$176,098	9	$31,332	5	$61,713	28	$28,027,176	25	$477,805
4	$12,536	10	$35,809	1	$9,300	1	$2,669	3	$7,208	9	$5,798
	768		7,987		----------		159		----------		36
	90		44,398		----------		2,040		4,500		1,890
	1,200		118,508		----------		2,040		9,000		3,000
	4,000		10,000		1,000		750		2,750		7,750
	48		120		12		9		33		93
	51		279		----------		189		138		27
	65		150		75		10		170		385
3	$48,328	10	$140,872	0	----------	0	----------	0	----------	1	$14,997
	1,400		2,010		----------		----------		----------		----------
	10,000		20,267		----------		----------		----------		1,540
	15,120		38,251		----------		----------		----------		3,000
	5,000		11,250		----------		----------		----------		750
	60		135		----------		----------		----------		9
	489		707		----------		----------		----------		----------
	40		180		----------		----------		----------		50
10	$374,026	3	$90,323		----------		----------	2	$77,799	1	$29,569
	6,908		1,274		----------		----------		92		1,948
	31,553		9,220		----------		----------		7,800		----------
	53,734		----------		----------		----------		----------		----------
	14,500		5,000		----------		----------		3,750		1,000
	174		60		----------		----------		45		12
	1,341		542		----------		----------		320		772
	465		50		----------		----------		110		20
8	$813,576	9	$707,314		----------	2	$248,852	1	$107,535	2	$160,075
	30,956		23,387		----------		5,310		----------		17,980
	85,147		90,460		----------		50,855		2,500		12,765
	57,858		106,170		----------		64,563		2,500		14,575
	28,750		28,250		----------		8,500		2,500		6,500
	345		339		----------		102		30		78
	26,798		4,985		----------		1,432		----------		268
	160		195		----------		40		25		75
6	$1,580,537		----------		----------		----------	3	$905,721	1	$280,172
	27,674		----------		----------		----------		119,236		4,491
	113,677		----------		----------		----------		167,047		----------
	115,564		----------		----------		----------		153,490		----------
	45,000		----------		----------		----------		27,000		1,750
	540		----------		----------		----------		324		21
	9,176		----------		----------		----------		3,748		----------
	295		----------		----------		----------		230		20
7	$7,391,441		----------		----------	1	$526,939	13	$196,622,512	2	$3,789,337
	126,083		----------		----------		107,351		34,105,479		399,584
	692,130		----------		----------		47,039		1,064,523		5,000
	291,750		----------		----------		47,039		812,538		4,000
	210,000		----------		----------		50,000		2,797,000		6,000
	2,520		----------		----------		600		33,564		72
	30,111		----------		----------		1,912		409,463		----------
	390		----------		----------		100		1,620		220
5	----------	2	----------	8	----------	1	----------	6	----------	9	----------
	----------		----------		----------		----------		$150		----------
	----------		----------		$2,500		$530		400		----------
	$4,500		$1,750		6,750		750		5,500		$8,000
	54		21		81		9		66		96
	----------		----------		10		----------		----------		----------
	135		30		230		20		1,150		995
43	$311,750	34	$56,250	9	$7,750	5	$60,000	28	$2,838,500	25	$31,750
	3,741		675		93		720		34,062		381
19	$2,670,891	14	$413,568	1	$9,300		----------	12	$46,490,034	7	$18,301

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 109	No. of corporations	Corporation Class 110	No. of corporations	Corporation Class 111
Total amount paid in for stock	13	$8,698,073	9	$4,921,735	43	$13,705,472
Total debt	13	$4,129,809	9	$1,659,906	43	$6,333,064
Showing gross receipts not exceeding $10,000	1	$4,839	0	-----	1	$6,478
Net profits reported		114		-----		-----
Assessed value		-----		-----		3,940
Actual value reported		-----		-----		7,000
Franchise assessment		750		-----		2,000
Franchise tax		9		-----		24
Total tax reported		-----		-----		165
License tax (levied since 1915)		20		-----		50
Showing gross receipts from $10,000 to $20,000	0	-----	1	$12,539	2	$31,591
Net profits reported		-----		497		-----
Assessed value		-----		17,367		18,585
Actual value reported		-----		5,650		32,300
Franchise assessment		-----		1,000		2,250
Franchise tax		-----		12		27
Total tax reported		-----		128		1,157
License tax (levied since 1915)		-----		20		45
Showing gross receipts from $20,000 to $50,000	4	$151,863	0	-----	3	$94,122
Net profits reported		2,838		-----		9,239
Assessed value		13,300		-----		14,680
Actual value reported		32,664		-----		-----
Franchise assessment		6,000		-----		7,250
Franchise tax		72		-----		87
Total tax reported		471		-----		738
License tax (levied since 1915)		65		-----		1,020
Showing gross receipts from $50,000 to $150,000	2	$192,358	4	$423,293	12	$1,200,848
Net profits reported		8,458		4,737		65,957
Assessed value		36,345		100,790		481,518
Actual value reported		-----		122,682		765,124
Franchise assessment		9,500		18,500		328,500
Franchise tax		114		222		3,942
Total tax reported		1,786		3,716		90,209
License tax (levied since 1915)		35		85		570
Showing gross receipts from $150,000 to $500,000	2	$364,554	2	$611,264	13	$4,179,226
Net profits reported		7,962		9,375		275,059
Assessed value		50,265		93,610		830,537
Actual value reported		116,000		79,670		1,546,351
Franchise assessment		11,500		18,000		316,000
Franchise tax		138		216		3,792
Total tax reported		1,939		1,656		233,169
License tax (levied since 1915)		40		75		850
Showing gross receipts exceeding $500,000	3	$32,385,525	1	$5,074,493	8	$9,866,212
Net profits reported		21,992		187,393		1,043,525
Assessed value		273,005		-----		1,240,975
Actual value reported		641,979		54,097		2,191,559
Franchise assessment		165,000		8,500		664,500
Franchise tax		1,980		102		7,974
Total tax reported		101,927		34,426		540,018
License tax (levied since 1915)		925		350		900
Inoperative corporations	1	-----	1	-----	4	-----
Assessed value		-----		-----		$7,225
Actual value reported		-----		-----		-----
Franchise assessment		$500		$1,000		2,750
Franchise tax		6		12		33
Total tax reported		-----		-----		-----
License tax (levied since 1915)		10		20		210
Total franchise assessment	13	$193,250	9	$47,000	43	$1,323,250
Total franchise tax		2,319		564		15,879
Gross receipts of corporations reporting no profits	4	$29,961,517	4	$530,341	8	$2,242,053

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 112	No. of corporations	Corporation Class 113	No. of corporations	Corporation Class 114	No. of corporations	Corporation Class 115	No. of corporations	Corporation Class 116	No. of corporations	Corporation Class 117
64	$8,023,661	11	$1,800,496	4	$1,556,487	6	$11,586,836	30	$11,978,591	39	$15,159,413
64	$2,060,094	11	$437,591	4	$7,348	6	$1,616,114	30	$6,303,215	39	$1,529,128
14	$64,907	2	$12,183	0	------------	1	$2,779	12	$45,419	13	$22,878
	1,816		1,569		------------		------------		2,026		1,291
	95,350		4,480		------------		------------		59,205		35,600
	109,800		------------		------------		------------		111,664		8,610
	15,750		2,000		------------		750		13,250		13,750
	189		24		------------		9		159		165
	2,572		99		------------		------------		1,754		1,023
	665		45		------------		100		595		565
4	$46,233	2	$25,801	0	------------	1	$17,304	1	$13,059	4	$65,861
	9,970		2,858		------------		------------		830		3,387
	71,185		975		------------		------------		1,400		11,478
	39,650		------------		------------		------------		4,200		44,950
	7,250		3,000		------------		1,000		1,250		5,500
	87		36		------------		12		15		66
	2,010		------------		------------		------------		82		499
	155		40		------------		15		20		105
13	$445,217	0	------------	1	$23,872	1	$31,303	3	$84,995	6	$249,847
	6,944		------------		579		1,270		9,414		45,907
	225,284		------------		------------		------------		150		34,070
	996,541		------------		------------		------------		42,806		64,205
	28,000		------------		1,000		1,250		7,750		29,750
	336		------------		12		15		93		357
	4,179		------------		36		37		104		1,874
	1,340		------------		25		10		120		305
12	$923,573	0	------------	0	------------	1	$52,436	2	$185,587	5	$383,574
	33,996		------------		------------		13,673		13,420		56,395
	262,116		------------		------------		3,000		5,370		101,828
	525,258		------------		------------		42,600		13,820		222,675
	50,000		------------		------------		4,000		9,250		22,500
	600		------------		------------		48		111		270
	8,987		------------		------------		274		603		3,213
	1,275		------------		------------		100		75		870
6	$1,807,341	2	$549,446	0	------------	0	------------	2	$351,986	3	$802,401
	84,034		37,993		------------		------------		32,752		164,341
	767,880		21,631		------------		------------		115,150		292,993
	1,082,368		22,291		------------		------------		1,232,661		612,992
	105,000		7,500		------------		------------		27,500		62,500
	1,260		90		------------		------------		330		750
	50,833		673		------------		------------		3,204		8,385
	330		100		------------		------------		250		150
2	$1,295,993	3	$3,046,321	2	$28,870,391	1	$13,814,506	6	$8,593,325	2	$7,067,397
	141,761		13,729		7,165,774		301,780		1,585,621		1,490,208
	554,280		111,321		161,523		11,125		2,772,156		52,410
	1,162,221		114,179		334,154		45,080		6,956,204		52,300
	100,000		47,500		105,500		55,000		1,435,000		35,000
	1,200		570		1,266		660		17,220		420
	19,849		2,113		226,764		120,446		97,675		36,740
	125		110		200		800		1,850		175
13	------------	2	------------	1	------------	1	------------	4	------------	6	------------
	$19,890		------------		------------		------------		$750		$43,941
	21,085		------------		------------		------------		1,500		39,750
	12,250		$2,000		$500		$5,000		3,500		15,750
	147		24		6		60		42		189
	46		------------		------------		------------		------------		------------
	1,425		30		25		10		175		1,220
64	$318,250	11	$62,000	4	$107,000	6	$67,000	30	$1,497,500	39	$184,750
	3,819		744		1,284		804		17,970		2,217
27	$1,209,126	2	$872,976	0	------------	2	$20,083	11	$106,186	15	$164,873

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 118	No. of corporations	Corporation Class 119	No. of corporations	Corporation Class 120
Total amount paid in for stock	12	$2,826,020	6	$4,472,661	7	$11,380,500
Total debt	12	$1,403,233	6	$3,700,754	7	$2,677,248
Showing gross receipts not exceeding $10,000	2	$12,250	4	$8,837	2	$10,363
Net profits reported		264		------------		120
Assessed value		------------		1,160		1,165
Actual value reported		------------		18,004		2,665
Franchise assessment		2,000		6,750		2,500
Franchise tax		24		81		30
Total tax reported		33		918		36
License tax (levied since 1915)		70		455		35
Showing gross receipts from $10,000 to $20,000	0	------------	0	------------	0	------------
Net profits reported		------------		------------		------------
Assessed value		------------		------------		------------
Actual value reported		------------		------------		------------
Franchise assessment		------------		------------		------------
Franchise tax		------------		------------		------------
Total tax reported		------------		------------		------------
License tax (levied since 1915)		------------		------------		------------
Showing gross receipts from $20,000 to $50,000	0	------------	0	------------	1	$48,045
Net profits reported		------------		------------		1,596
Assessed value		------------		------------		------------
Actual value reported		------------		------------		35,000
Franchise assessment		------------		------------		1,250
Franchise tax		------------		------------		15
Total tax reported		------------		------------		------------
License tax (levied since 1915)		------------		------------		25
Showing gross receipts from $50,000 to $150,000	2	$157,722	0	------------	2	$205,461
Net profits reported		7,299		------------		838
Assessed value		15,977		------------		20,850
Actual value reported		33,960		------------		37,500
Franchise assessment		6,250		------------		3,500
Franchise tax		75		------------		42
Total tax reported		541		------------		195
License tax (levied since 1915)		85		------------		35
Showing gross receipts from $150,000 to $500,000	1	$195,412	0	------------	1	$155,162
Net profits reported		17,863		------------		------------
Assessed value		40,215		------------		4,570
Actual value reported		69,565		------------		6,000
Franchise assessment		10,000		------------		5,000
Franchise tax		120		------------		60
Total tax reported		1,491		------------		157
License tax (levied since 1915)		20		------------		50
Showing gross receipts exceeding $500,000	2	$2,161,067	1	$2,016,835	1	$5,381,464
Net profits reported		42,237		22,478		1,582,988
Assessed value		587,385		------------		------------
Actual value reported		622,170		19,596		------------
Franchise assessment		97,000		3,000		65,000
Franchise tax		1,164		36		780
Total tax reported		21,104		11,620		58,572
License tax (levied since 1915)		25		550		1,000
Inoperative corporations	5	------------	1	------------	0	------------
Assessed value		$63,920		------------		------------
Actual value reported		30,000		------------		------------
Franchise assessment		3,250		$750		------------
Franchise tax		39		9		------------
Total tax reported		378		------------		------------
License tax (levied since 1915)		1,245		25		------------
Total franchise assessment	12	$118,500	6	$10,500	7	$77,250
Total franchise tax		1,422		126		927
Gross receipts of corporations reporting no profits	2	$711,547	4	$8,837	2	$164,425

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 121	No. of corporations	Corporation Class 122	No. of corporations	Corporation Class 123	No. of corporations	Corporation Class 124	No. of corporations	Corporation Class 125	No. of corporations	Corporation Class 126
54	$23,940,190	200	$204,598,595	14	$2,655,022	78	$19,322,332	39	$15,514,647	24	$3,901,360
54	$2,366,292	200	$94,692,265	14	$2,032,178	78	$7,506,614	39	$2,848,313	24	$1,143,364
22	$71,117	38	$95,189	0	-----------	14	$43,071	1	$430	5	$27,654
	7,195		3,849		-----------		1,253		-----------		2,340
	9,801		26,392		-----------		84,799		1,000		2,490
	18,084		59,873		-----------		21,432		1,000		22,642
	22,000		39,000		-----------		14,000		1,000		5,250
	264		468		-----------		168		12		63
	498		1,297		-----------		427		24		151
	680		1,700		-----------		680		25		150
3	$46,519	11	$153,793	1	$12,641	3	$46,671	3	$46,829	3	$49,429
	8,887		15,476		-----------		937		3.032		1,114
	1,640		19,744		1,700		8,385		1,891		2,003
	-----------		252,493		6,250		6,200		22,186		4,510
	3,750		20,750		1,000		3,500		6,000		3,000
	45		249		12		42		72		36
	84		1,305		749		245		182		78
	140		1,285		20		55		85		125
9	$299,461	21	$703,523	1	$39,367	11	$346,447	8	$245,357	6	$191,406
	8,352		54,689		6,658		19,497		3,538		10,550
	19,948		139,810		10,985		76,348		21,268		21,395
	38,619		314,451		25,000		51,858		42,775		35,085
	15,250		67,250		4,500		13,250		12,000		12,750
	183		807		54		159		144		153
	1,160		5,776		745		2,296		1,021		990
	240		615		25		420		120		170
3	$230,108	18	$1,897,663	4	$369,969	10	$876,040	14	$1,332,198	4	$428,036
	15,637		72,131		6,583		39,289		68,956		10,424
	12,070		409,250		136,643		64,730		118,901		38,700
	25,055		633,426		160,719		77,610		167,811		76,500
	7,250		91,000		32,500		36,500		57,500		10,750
	87		1,092		390		438		690		129
	854		13,696		2,629		2,435		5,153		1,610
	75		530		115		275		270		65
3	$726,875	26	$7,017,332	2	$396,408	18	$4,532,914	4	$972,211	2	$519,807
	38,599		459,544		2,282		363,684		10,137		14,444
	200,849		964,711		46,858		736,055		114,820		60,562
	210,329		1,849,633		-----------		1,531,233		364,900		38,047
	27,500		274,750		9,000		328,500		27,500		22,500
	330		3,297		108		3,942		330		270
	8,487		40,768		1,669		32,151		6,430		1,153
	105		1,640		30		1,070		100		50
7	$52,313,274	30	$310,063,700	3	$5,835,696	9	$53,497,262	6	$8,800,807	3	$6,541,432
	5,007,461		21,451,254		121,190		2,814,519		547,620		521,554
	164,123		3,046,254		153,240		689,134		222,265		164,835
	628,189		5,565,674		163,053		1,106,492		278,272		242,116
	344,000		1,433,250		51,000		395,500		124,500		67,500
	4,128		17,199		612		4,746		1,494		810
	322,659		1,463,394		14,252		133,097		75,592		50,376
	2,495		9,390		220		2,535		1,245		400
7	-----------	56	-----------	3	-----------	13	-----------	3	-----------	1	-----------
	$18,708		$84,345		-----------		$14,787		-----------		-----------
	3,732		146,261		$500		1,450		$23,262		-----------
	16,750		77,250		2,000		10,500		6,750		$1,000
	201		927		24		126		81		12
	10		583		-----------		37		-----------		-----------
	390		4,245		60		485		185		50
54	$436,500	200	$2,003,250	14	$100,000	78	$801,750	39	$235,250	24	$122,750
	5,238		24,039		1,200		9,621		2,823		1,473
20	$559,684	57	$4,367,079	3	$306,703	19	$722,953	12	$1,897,067	13	$535,710

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Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 127	No. of corporations	Corporation Class 128	No. of corporations	Corporation Class 129
Total amount paid in for stock	58	$6,281,906	7	$613,187	70	$8,925,441
Total debt	58	$3,032,382	7	$560,993	70	$6,803,163
Showing gross receipts not exceeding $10,000	11	$14,529	0	------------	10	$39,790
Net profits reported		482		------------		2,959
Assessed value		4,383		------------		58,015
Actual value reported		5,033		------------		122,600
Franchise assessment		11,250		------------		11,000
Franchise tax		135		------------		132
Total tax reported		115		------------		1,390
License tax (levied since 1915)		240		------------		205
Showing gross receipts from $10,000 to $20,000	4	$64,011	1	$10,925	7	$88,181
Net profits reported		13,732		38		15,765
Assessed value		10,975		------------		19,033
Actual value reported		22,519		------------		67,926
Franchise assessment		6,250		1,000		11,250
Franchise tax		75		12		135
Total tax reported		384		53		754
License tax (levied since 1915)		70		15		665
Showing gross receipts from $20,000 to $50,000	8	$312,356	2	$79,001	16	$501,675
Net profits reported		7,794		2,506		95,077
Assessed value		56,235		2,650		174,970
Actual value reported		159,066		------------		234,423
Franchise assessment		16,500		3,750		58,750
Franchise tax		198		45		705
Total tax reported		2,400		140		8,159
License tax (levied since 1915)		160		45		485
Showing gross receipts from $50,000 to $150,000	11	$1,007,090	2	$145,669	12	$795,452
Net profits reported		22,661		15,058		109,283
Assessed value		248,685		23,299		302,520
Actual value reported		387,750		58,858		299,290
Franchise assessment		56,000		5,000		64,000
Franchise tax		672		60		768
Total tax reported		9,296		646		12,617
License tax (levied since 1915)		330		45		360
Showing gross receipts from $150,000 to $500,000	3	$685,994	1	$174,273	7	$1,640,295
Net profits reported		38,319		566		420,501
Assessed value		97,861		18,410		676,688
Actual value reported		114,980		36,820		982,220
Franchise assessment		21,000		4,500		203,000
Franchise tax		252		54		2,436
Total tax reported		2,870		575		20,787
License tax (levied since 1915)		95		10		425
Showing gross receipts exceeding $500,000	5	$15,387,409	1	$982,777	3	$3,174,670
Net profits reported		597,821		------------		536,810
Assessed value		431,894		40,152		1,578,061
Actual value reported		62,085		134,506		1,056,755
Franchise assessment		298,250		10,000		638,000
Franchise tax		3,579		120		7,656
Total tax reported		47,411		4,051		48,614
License tax (levied since 1915)		575		75		1,550
Inoperative corporations	16	------------	0	------------	15	------------
Assessed value		$1,950		------------		$6,845
Actual value reported		3,000		------------		9,502
Franchise assessment		13,750		------------		13,250
Franchise tax		165		------------		159
Total tax reported		21		------------		122
License tax (levied since 1915)		690		------------		330
Total franchise assessment	58	$423,000	7	$24,250	70	$999,250
Total franchise tax		5,076		291		11,991
Gross receipts of corporations reporting no profits	22	$7,193,432	2	$1,034,419	9	$288,293

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 130	No. of corporations	Corporation Class 131	No. of corporations	Corporation Class 132	No. of corporations	Corporation Class 133	No. of corporations	Corporation Class 134	No. of corporations	Corporation Class 135
4	$118,950	7	$220,006	26	$1,323,287	18	$265,039	63	$4,949,575	3	$16,353,805
4	$64,779	7	$20,197	26	$631,538	18	$741,680	63	$2,729,744	3	$1,386,463
1	$3,609	2	$5,371	4	$13,142	2	$2,925	8	$29,493	0	-----------
	1,570		1,689		530		40		3,551		-----------
	1,100		155		2,000		151,548		22,069		-----------
	3,975		-----------		-----------		151,548		115,446		-----------
	1,000		2,000		4,750		11,000		8,500		-----------
	12		24		57		132		102		-----------
	27		17		1,103		1,499		579		-----------
	20		30		55		125		285		-----------
0	-----------	0	-----------	5	$74,385	1	$16,000	3	$46,920	0	-----------
	-----------		-----------		2,105		-----------		4,443		-----------
	-----------		-----------		10,190		-----------		1,700		-----------
	-----------		-----------		11,890		-----------		12,866		-----------
	-----------		-----------		6,250		1,000		4,250		-----------
	-----------		-----------		75		12		51		-----------
	-----------		-----------		427		37		254		-----------
	-----------		-----------		80		20		35		-----------
0	-----------	0	-----------	4	$154,559	1	$23,308	9	$313,778	0	-----------
	-----------		-----------		4,293		-----------		31,952		-----------
	-----------		-----------		15,147		-----------		44,374		-----------
	-----------		-----------		30,964		-----------		25,065		-----------
	-----------		-----------		7,750		1,000		15,500		-----------
	-----------		-----------		93		12		186		-----------
	-----------		-----------		307		-----------		1,140		-----------
	-----------		-----------		55		25		205		-----------
1	$101,074	2	$197,232	7	$621,971	7	$663,828	14	$1,154,135	1	$91,463
	2,544		12,218		18,465		23,288		38,876		10,657
	13,400		-----------		51,974		191,880		226,649		31,000
	40,575		-----------		163,284		105,421		310,930		58,021
	3,500		7,000		23,750		24,250		67,250		13,500
	42		84		285		291		807		162
	627		189		1,696		2,380		8,248		1,263
	25		40		230		175		315		50
0	-----------	0	-----------	2	$503,987	4	$870,299	14	$3,891,675	0	-----------
	-----------		-----------		24,803		15,447		152,979		-----------
	-----------		-----------		7,925		62,840		659,929		-----------
	-----------		-----------		9,550		30,163		1,144,615		-----------
	-----------		-----------		11,500		24,500		187,000		-----------
	-----------		-----------		138		294		2,244		-----------
	-----------		-----------		1,395		6,375		29,436		-----------
	-----------		-----------		45		75		530		-----------
0	-----------	2	$8,890,440	3	$1,952,218	0	-----------	3	$3,132,754	1	$9,331,702
	-----------		270,865		35,016		-----------		28,097		1,542,234
	-----------		21,215		226,031		-----------		439,180		1,135,059
	-----------		42,430		118,452		-----------		906,312		-----------
	-----------		27,000		50,500		-----------		94,500		300,000
	-----------		324		606		-----------		1,134		3,600
	-----------		58,674		12,529		-----------		18,582		-----------
	-----------		820		200		-----------		275		1,000
2	-----------	1	-----------	1	-----------	3	-----------	12	-----------	1	-----------
	-----------		-----------		-----------		$1,060		$59,800		-----------
	-----------		-----------		-----------		1,500		201,500		-----------
	$1,750		$750		$750		2,500		24,250		$1,250
	21		9		9		30		291		15
	10		10		-----------		35		1,943		13
	40		25		10		110		250		15
4	$6,250	7	$36,750	26	$105,250	18	$64,250	63	$401,250	3	$314,750
	75		441		1,263		771		4,815		3,777
	-----------	2	$5,149,103	6	$881,464	4	$241,849	15	$2,119,996	0	-----------

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 136	No. of corporations	Corporation Class 137	No. of corporations	Corporation Class 138
Total amount paid in for stock	50	$5,145,018	141	$203,120,334	34	$5,681,722
Total debt	50	$746,891	141	$38,262,317	34	$1,057,526
Showing gross receipts not exceeding $10,000	25	$73,610	10	$57,928	5	$10,838
Net profits reported		12,652		802		754
Assessed value		4,203		8,591		24,694
Actual value reported		7,222		31,491		6,000
Franchise assessment		25,750		9,750		5,750
Franchise tax		309		117		69
Total tax reported		665		144		336
License tax (levied since 1915)		675		350		175
Showing gross receipts from $10,000 to $20,000	2	$31,118	8	$120,179	4	$67,664
Net profits reported		3,276		3,797		365
Assessed value		1,800		2,461		2,250
Actual value reported		2,500		36,709		4,640
Franchise assessment		4,000		9,250		4,250
Franchise tax		48		111		51
Total tax reported		155		293		246
License tax (levied since 1915)		25		145		70
Showing gross receipts from $20,000 to $50,000	3	$84,519	29	$1,022,443	6	$171,765
Net profits reported		3,446		42,057		3,769
Assessed value		2,685		244,653		13,942
Actual value reported		2,754		209,813		14,365
Franchise assessment		6,500		64,500		9,250
Franchise tax		78		774		111
Total tax reported		243		8,962		680
License tax (levied since 1915)		185		505		90
Showing gross receipts from $50,000 to $150,000	2	$221,245	32	$2,540,616	9	$921,595
Net profits reported		37,433		139,690		34,103
Assessed value		21,680		289,283		97,516
Actual value reported		118,895		518,757		122,672
Franchise assessment		20,500		117,750		36,000
Franchise tax		246		1,413		432
Total tax reported		1,415		12,809		2,637
License tax (levied since 1915)		100		760		240
Showing gross receipts from $150,000 to $500,000	1	$242,946	28	$7,723,921	0	------------
Net profits reported		61,168		229,813		------------
Assessed value		62,702		1,144,012		------------
Actual value reported		240,000		1,519,386		------------
Franchise assessment		80,000		320,750		------------
Franchise tax		960		3,849		------------
Total tax reported		3,323		44,105		------------
License tax (levied since 1915)		50		1,230		------------
Showing gross receipts exceeding $500,000	3	$2,765,888	23	$144,728,901	5	$10,032,889
Net profits reported		545,313		8,503,431		767,612
Assessed value		12,510		1,362,205		1,408,800
Actual value reported		44,030		1,838,804		2,537,319
Franchise assessment		11,250		664,000		632,500
Franchise tax		135		7,968		7,590
Total tax reported		19,938		941,202		56,569
License tax (levied since 1915)		145		6,695		1,200
Inoperative corporations	14	------------	11	------------	5	------------
Assessed value		$100		$17,800		$47,000
Actual value reported		1,100		18,500		188,463
Franchise assessment		13,250		13,000		31,750
Franchise tax		159		156		381
Total tax reported		18		------------		------------
License tax (levied since 1915)		635		305		430
Total franchise assessment	50	$161,250	141	$1,199,000	34	$719,500
Total franchise tax		1,935		14,388		8,634
Gross receipts of corporations reporting no profits	16	$81,376	41	$18,161,069	9	$320,507

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 139	No. of corporations	Corporation Class 140	No. of corporations	Corporation Class 141	No. of corporations	Corporation Class 142	No. of corporations	Corporation Class 143	No. of corporations	Corporation Class 144
69	$4,955,173	50	$1,396,947	9	$7,510,810	44	$3,600,847	44	$4,063,739	36	$2,461,570
69	$7,037,739	50	$507,963	9	$2,306,654	44	$590,827	44	$3,651,550	36	$3,019,994
24	$44,938	9	$40,335	2	$8,414	12	$12,847	6	$18,951	4	$7,913
	7,419		5,264		158		23		883		352
	16,451		250		------------		7,165		2,650		------------
	7,627		18,327		1,000		12,005		1,553		------------
	24,750		9,000		1,750		11,250		6,000		3,750
	297		108		21		135		72		45
	698		171		74		414		108		59
	870		215		45		415		135		95
8	$112,454	1	$10,718	0	------------	1	$18,896	5	$70,744	3	$47,406
	13,328		------------		------------		------------		5,531		6,724
	19,980		3,300		------------		4,600		5,415		3,670
	17,818		16,800		------------		4,600		24,404		29,000
	13,250		1,500		------------		1,000		7,250		4,000
	159		18		------------		12		87		48
	453		58		------------		------------		291		160
	305		10		------------		50		175		110
4	$147,393	3	$78,604	1	$47,794	3	$92,882	3	$89,924	4	$142,530
	5,474		18,600		------------		320		1,001		5,968
	9,654		2,100		49,060		14,480		1,200		4,300
	9,654		10,000		55,000		------------		4,000		6,298
	5,750		3,500		4,500		5,250		4,250		7,750
	69		42		54		63		51		93
	504		38		1,329		480		233		319
	105		125		75		40		50		60
1	$149,311	5	$482,967	0	------------		------------	7	$557,584	8	$617,730
	9,571		34,341		------------		------------		26,779		19,971
	2,840		7,150		------------		------------		34,675		99,979
	------------		500		------------		------------		54,911		160,854
	3,000		17,750		------------		------------		21,000		28,250
	36		213		------------		------------		252		339
	1,434		224		------------		------------		2,286		3,017
	75		215		------------		------------		145		155
2	$485,908	1	$253,716	1	$245,558	1	$195,966	8	$2,117,610	5	$1,131,295
	105,064		------------		303		40,920		110,460		117,322
	527,955		------------		23,379		------------		191,095		165,110
	882,222		------------		------------		2,828		463,576		327,600
	84,750		6,000		7,000		1,250		76,250		54,250
	1,017		72		84		15		915		651
	14,440		63		685		1,064		8,240		4,847
	900		10		25		25		280		165
3	$8,476,037	2	$1,234,366	3	$8,213,881	3	$3,972,418	9	$18,796,293	4	$9,372,705
	190,760		13,209		353,531		138,170		1,179,482		764,716
	5,629		6,605		20,694		27,492		1,431,841		558,285
	33,197		14,755		50,295		15,000		1,167,095		1,420,251
	19,000		8,500		37,750		21,500		378,000		335,000
	228		102		453		258		4,536		4,020
	18,332		382		70,292		31,422		112,287		102,223
	325		150		1,095		400		1,020		1,250
27	------------	29	------------	2	------------	24	------------	6	------------	8	------------
	$2,044		$63,685		$10,200		------------		$5,151		------------
	21,598		156,645		------------		$900		6,926		------------
	24,750		45,500		17,500		25,250		9,750		$7,000
	297		546		210		303		117		84
	218		1,333		312		10		154		------------
	1,285		1,155		125		700		135		290
69	$175,250	50	$91,750	9	$68,500	44	$65,500	44	$502,500	36	$440,000
	2,103		1,101		822		786		6,030		5,280
26	$5,845,025	12	$1,165,660	2	$47,930	14	$1,978,020	11	$1,911,588	9	$491,461

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporation	Corporation Class 145	No. of corporation	Corporation Class 146	No. of corporation	Corporation Class 147
Total amount paid in for stock	9	$1,524,525	33	$2,161,375	10	$49,985,470
Total debt	9	$828,033	33	$2,076,655	10	$21,205,050
Showing gross receipts not exceeding $10,000	1	$2,334	8	$33,081	2	$3,961
Net profits reported		----------		6,667		21
Assessed value		----------		8,515		325
Actual value reported		----------		16,954		540
Franchise assessment		1,000		8,250		1,750
Franchise tax		12		99		21
Total tax reported		10		264		17
License tax (levied since 1915)		25		205		220
Showing gross receipts from $10,000 to $20,000	1	$12,400	3	$41,423	0	----------
Net profits reported		396		231		----------
Assessed value		----------		2,025		----------
Actual value reported		----------		11,182		----------
Franchise assessment		1,000		3,000		----------
Franchise tax		12		36		----------
Total tax reported		21		54		----------
License tax (levied since 1915)		10		80		----------
Showing gross receipts from $20,000 to $50,000	1	$22,145	5	$188,560	0	----------
Net profits reported		----------		2,445		----------
Assessed value		6,910		21,882		----------
Actual value reported		11,500		63,014		----------
Franchise assessment		1,250		10,000		----------
Franchise tax		15		120		----------
Total tax reported		208		800		----------
License tax (levied since 1915)		25		90		----------
Showing gross receipts from $50,000 to $150,000	2	$144,920	4	$392,651	1	$70,805
Net profits reported		9,285		25,400		160
Assessed value		18,150		33,588		3,882
Actual value reported		123,779		59,044		3,850
Franchise assessment		10,000		17,000		2,000
Franchise tax		120		204		24
Total tax reported		401		2,356		203
License tax (levied since 1915)		175		95		20
Showing gross receipts from $150,000 to $500,000	1	$190,738	6	$1,644,718	2	$548,684
Net profits reported		36,225		90,993		53,558
Assessed value		----------		224,765		48,429
Actual value reported		6,325		332,845		89,000
Franchise assessment		11,000		96,000		40,000
Franchise tax		132		1,152		480
Total tax reported		1,751		15,621		2,166
License tax (levied since 1915)		25		370		75
Showing gross receipts exceeding $500,000	0	----------	0	----------	5	$30,131,863
Net profits reported		----------		----------		5,407,916
Assessed value		----------		----------		1,253,541
Actual value reported		----------		----------		3,190,020
Franchise assessment		----------		----------		440,500
Franchise tax		----------		----------		5,286
Total tax reported		----------		----------		213,942
License tax (levied since 1915)		----------		----------		2,650
Inoperative corporations	3	----------	7	----------		----------
Assessed value		$143		----------		----------
Actual value reported		4,000		----------		----------
Franchise assessment		3,000		$5,500		----------
Franchise tax		36		66		----------
Total tax reported		----------		----------		----------
License tax (levied since 1915)		175		170		----------
Total franchise assessment	9	$27,250	33	$139,750	10	$484,250
Total franchise tax		327		1,677		5,811
Gross receipts of corporations reporting no profits	3	78,030	8	425,670	1	244

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporation	Corporation Class 148	No. of corporation	Corporation Class 149	No. of corporation	Corporation Class 150	No. of corporation	Corporation Class 151	No. of corporation	Corporation Class 152	No. of corporation	Corporation Class 153
40	$15,527,854	13	$1,609,343	16	$324,324,780	40	$23,340,763	6	$1,856,993	4	$5,598,500
40	$7,247,356	13	819,447	16	$12,241,310	40	$11,088,856	6	$942,192	4	$37,249,667
4	$24,815	1	$2,590	0	------------	4	$18,664	1	$3,128	0	------------
	4,459		------------		------------		------------		------------		------------
	24,455		6,000		------------		24,810		------------		------------
	63,131		10,000		------------		93,733		------------		------------
	5,000		1,000		------------		5,250		1,000		------------
	60		12		------------		63		12		------------
	111		95		------------		267		------------		------------
	115		25		------------		500		25		------------
2	$31,569	1	$11,817	0	------------	2	$29,078	0	------------	0	------------
	------------		223		------------		575		------------		------------
	10,350		13,500		------------		7,610		------------		------------
	19,328		32,000		------------		10,246		------------		------------
	2,750		1,000		------------		2,250		------------		------------
	33		12		------------		27		------------		------------
	205		318		------------		258		------------		------------
	35		25		------------		30		------------		------------
8	$289,212	2	$59,851	0	------------	1	$29,184	1	$28,016	0	------------
	14,137		6,817		------------		------------		1,405		------------
	44,815		31,475		------------		7,680		2,784		------------
	79,391		56,800		------------		20,045		2,784		------------
	15,000		4,250		------------		2,000		1,750		------------
	180		51		------------		24		21		------------
	1,291		830		------------		252		8,033		------------
	250		45		------------		20		25		------------
7	$590,045	2	$264,850	2	$223,595	4	$328,952	1	$86,825	0	------------
	81,839		6,857		------------		10,341		------------		------------
	228,605		73,040		223,510		225		13,640		------------
	91,229		187,536		355,756		8,136		42,000		------------
	39,750		7,500		55,000		13,500		5,000		------------
	477		90		660		162		60		------------
	3,520		1,919		18,822		861		------------		------------
	649		65		300		350		25		------------
7	$1,905,914	2	$523,495	1	$320,625	5	$1,264,278	0	------------	0	------------
	116,829		100,862		------------		45,028		------------		------------
	320,516		151,175		------------		164,770		------------		------------
	341,738		182,221		------------		43,055		------------		------------
	75,500		44,500		6,500		32,500		------------		------------
	906		534		78		390		------------		------------
	10,776		3,278		1,732		3,928		------------		------------
	575		175		10		265		------------		------------
5	$11,940,762	0	------------	11	$40,200,887	15	$42,476,620	2	$2,500,467	4	$49,613,893
	192,343		------------		4,620,143		2,032,170		63,922		405,756
	207,278		------------		8,965,499		810,007		19,227		10,570
	107,519		------------		22,635,658		1,016,140		29,954		32,610
	234,000		------------		2,830,000		414,250		8,500		53,000
	2,808		------------		33,960		4,971		102		636
	21,692		------------		600,951		116,270		559		459,202
	800		------------		4,000		1,845		65		575
7	------------	5	------------	2	------------	9	------------	1	------------	0	------------
	------------		------------		------------		$680		------------		------------
	------------		$900		------------		16,650		------------		------------
	$9,500		6,000		$2,000		13,000		$750		------------
	114		72		24		156		9		------------
	27		------------		------------		108		99		------------
	395		545		50		615		100		------------
40	$381,500	13	$64,250	16	$2,893,500	40	$182,750	6	$17,000	4	$53,000
	4,578		771		34,722		5,793		204		636
15	$2,820,734	2	$141,614	5	$3,951,292	15	$24,259,439	2	$89,953	0	------------

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporation	Corporation Class 154	No. of corporation	Corporation Class 155	No. of corporation	Corporation Class 156
Total amount paid in for stock	17	$4,921,020	10	$984,770	30	$2,241,754
Total debt	17	$2,373,902	10	$26,023	30	$3,754,262
Showing gross receipts not exceeding $10,000	3	$12,825	1	$5,447	9	$23,533
Net profits reported		3,545		------------		575
Assessed value		500		------------		7,250
Actual value reported		500		------------		15,133
Franchise assessment		10,250		1,000		9,000
Franchise tax		123		12		108
Total tax reported		2,635		660		220
License tax (levied since 1915)		105		15		190
Showing gross receipts from $10,000 to $20,000	3	$42,469	0	------------	3	$41,476
Net profits reported		625		------------		525
Assessed value		12,860		------------		33,780
Actual value reported		11,000		------------		30,050
Franchise assessment		3,750		------------		4,500
Franchise tax		45		------------		54
Total tax reported		250		------------		867
License tax (levied since 1915)		50		------------		90
Showing gross receipts from $20,000 to $50,000	3	$70,644	1	$49,892	1	$30,605
Net profits reported		1,565		1,685		2,242
Assessed value		142,450		1,775		8,368
Actual value reported		234,100		4,000		15,500
Franchise assessment		8,000		2,000		2,500
Franchise tax		96		24		30
Total tax reported		4,984		------------		387
License tax (levied since 1915)		950		20		100
Showing gross receipts from $50,000 to $150,000	1	$68,016	1	$52,062	7	$588,041
Net profits reported		1,023		2,038		53.367
Assessed value		3,000		------------		53,058
Actual value reported		4,500		------------		50,134
Franchise assessment		3,000		2,000		29,750
Franchise tax		36		24		357
Total tax reported		138		95		2,461
License tax (levied since 1915)		20		10		170
Showing gross receipts from $150,000 to $500,000	3	$1,051,501	0	------------	4	$1,007,975
Net profits reported		65,379		------------		74,469
Assessed value		676,395		------------		157,212
Actual value reported		804,300		------------		404,674
Franchise assessment		164,000		------------		57,000
Franchise tax		1,968		------------		684
Total tax reported		21,538		------------		5,289
License tax (levied since 1915)		325		------------		195
Showing gross receipts exceeding $500,000	2	$5,344,861	0	------------	3	$48,992,670
Net profits reported		536,763		------------		336,755
Assessed value		1,242,434		------------		148,594
Actual value reported		1,955,000		------------		411,147
Franchise assessment		330,000		------------		70,000
Franchise tax		3,960		------------		840
Total tax reported		37,699		------------		15,733
License tax (levied since 1915)		25		------------		120
Inoperative corporations	2	------------	7	------------	3	------------
Assessed value		------------		$300		$13,000
Actual value reported		------------		600		44,000
Franchise assessment		$2,500		6,000		51,250
Franchise tax		30		72		615
Total tax reported		------------		11		240
License tax (levied since 1915)		220		250		105
Total franchise assessment	17	$521,500	10	$11,000	30	$224,000
Total franchise tax		6,258		132		2,688
Gross receipts of corporations reporting no profits	5	$423,481	1	$5,447	11	$46,893,761

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporation	Corporation Class 157	No. of corporation	Corporation Class 158	No. of corporation	Corporation Class 159	No. of corporation	Corporation Class 160	No. of corporation	Corporation Class 161	No. of corporation	Corporation Class 162
16	$5,602,517	13	$836,326	14	$2,203,571	8	$7,865,150	6	$5,070,562	23	$4,358,282
16	$2,481,088	13	$291,972	14	$881,762	8	$1,002,334	6	$96,898	23	$2,776,277
1	$104	5	$14,248	1	$2,000	1	$1,613	3	$19,080	2	$12,801
	----------		11		----------		10		----------		----------
	----------		3,265		----------		650		2,420		6,210
	----------		20,950		----------		500		5,440		----------
	1,000		5,000		1,000		1,000		3,000		3,250
	12		60		12		12		36		39
	123		237		1,710		8		17		156
	25		140		10		75		40		45
2	$28,531	2	$30,741	1	$13,348	0	----------	1	$16,649	0	----------
	389		1,906		----------		----------		833		----------
	1,695		7,870		8,145		----------		----------		----------
	3,843		19,206		13,740		----------		----------		----------
	2,250		3,000		1,000		----------		1,000		----------
	27		36		12		----------		12		----------
	114		284		151		----------		86		----------
	45		60		20		----------		15		----------
2	$77,658	2	$44,596	4	$158,960	0	----------	0	----------	1	$34,263
	7,039		----------		276		----------		----------		334
	10,295		19,750		9,422		----------		----------		6,175
	2,850		77,529		91,748		----------		----------		16,000
	6,750		2,500		7,000		----------		----------		2,000
	81		30		84		----------		----------		24
	131		416		1,242		----------		----------		284
	35		100		60		----------		----------		25
3	$273,198	0	----------	4	$553,781	3	$207,750	0	----------	[illegible]	$412,652
	1,671		----------		25,748		1,238		----------		8,937
	10,950		----------		12,857		28,737		----------		60,660
	42,021		----------		9,000		33,325		----------		220,897
	10,250		----------		16,500		10,000		----------		18,250
	123		----------		198		120		----------		219
	1,359		----------		9,846		884		----------		3,659
	75		----------		65		120		----------		150
4	$1,518,722	0	----------	1	$228,691	3	$612,947	0	----------	6	$1,933,628
	152,626		----------		7,722		11,970		----------		36,588
	188,089		----------		63,760		98,501		----------		178,553
	489,914		----------		108,940		83,063		----------		107,147
	68,000		----------		8,500		17,000		----------		53,000
	816		----------		102		204		----------		636
	6,153		----------		406		2,734		----------		5,858
	320		----------		20		70		----------		250
2	$9,807,411	0	----------	2	$3,172,457	1	$5,611,537	1	$5,809,501	7	$7,332,941
	651,690		----------		182,774		409,347		76,452		365,827
	26,497		----------		9,409		27,800		42,098		558,087
	36,458		----------		----------		69,280		51,344		2,523,682
	23,500		----------		27,000		23,000		10,000		279,000
	282		----------		324		276		120		3,348
	48,364		----------		101		51,953		39,650		22,345
	550		----------		400		100		350		500
2	----------	4	----------	1	----------	0	----------	1	----------	3	----------
	----------		$14,630		----------		----------		----------		----------
	----------		50,000		----------		----------		----------		----------
	$1,750		3,500		$1,000		----------		$1,000		$3,000
	21		42		12		----------		12		36
	----------		15		80		----------		17		20
	35		1,105		10		----------		15		95
16	$113,500	13	$14,000	14	$62,000	8	$51,000	6	$15,000	23	$358,500
	1,362		168		744		612		180		4,302
3	$198,175	7	$74,324	5	$257,875	1	$88,977	3	$19,080	5	$449,195

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Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 163	No. of corporations	Corporation Class 164	No. of corporations	Corporation Class 165
Total amount paid in for stock	13	$233,203	4	$1,967,540	12	$597,968
Total debt	13	$89,123	4	$336,531	12	$413,249
Showing gross receipts not exceeding $10,000	7	$14,244	0	------------	1	$9,203
Net profits reported		896		------------		484
Assessed value		1,070		------------		880
Actual value reported		------------		------------		1,200
Franchise assessment		7,250		------------		1,000
Franchise tax		87		------------		12
Total tax reported		158		------------		29
License tax (levied since 1915)		215		------------		10
Showing gross receipts from $10,000 to $20,000	0	------------	0	------------	0	------------
Net profits reported		------------		------------		------------
Assessed value		------------		------------		------------
Actual value reported		------------		------------		------------
Franchise assessment		------------		------------		------------
Franchise tax		------------		------------		------------
Total tax reported		------------		------------		------------
License tax (levied since 1915)		------------		------------		------------
Showing gross receipts from $20,000 to $50,000	0	------------	0	------------	2	$54,853
Net profits reported		------------		------------		1,606
Assessed value		------------		------------		11,150
Actual value reported		------------		------------		13,400
Franchise assessment		------------		------------		5,500
Franchise tax		------------		------------		66
Total tax reported		------------		------------		392
License tax (levied since 1915)		------------		------------		40
Showing gross receipts from $50,000 to $150,000	1	$131,851	0	------------	4	$486,799
Net profits reported		------------		------------		54,857
Assessed value		4,830		------------		149,185
Actual value reported		------------		------------		90,836
Franchise assessment		3,000		------------		18,500
Franchise tax		36		------------		222
Total tax reported		290		------------		4,471
License tax (levied since 1915)		50		------------		110
Showing gross receipts from $150,000 to $500,000	0	------------	1	$423,861	2	$530,036
Net profits reported		------------		40,907		48,402
Assessed value		------------		799		182,308
Actual value reported		------------		------------		331,000
Franchise assessment		------------		2,000		46,000
Franchise tax		------------		24		552
Total tax reported		------------		224		6,092
License tax (levied since 1915)		------------		25		95
Showing gross receipts exceeding $500,000	0	------------	1	$1,600,294	0	------------
Net profits reported		------------		------------		------------
Assessed value		------------		4,400		------------
Actual value reported		------------		------------		------------
Franchise assessment		------------		6,500		------------
Franchise tax		------------		78		------------
Total tax reported		------------		------------		------------
License tax (levied since 1915)		------------		200		------------
Inoperative corporations	5	------------	2	------------	3	------------
Assessed value		------------		------------		$1,115
Actual value reported		------------		------------		1,115
Franchise assessment		$3,750		$3,250		2,750
Franchise tax		45		39		33
Total tax reported		------------		61		------------
License tax (levied since 1915)		85		125		60
Total franchise assessment	13	$14,000	4	$11,750	12	$73,750
Total franchise tax		168		141		885
Gross receipts of corporations reporting no profits	6	$141,738	1	$1,600,294	1	$27,570

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 166	No. of corporations	Corporation Class 167	No. of corporations	Corporation Class 168	No. of corporations	Corporation Class 169	No. of corporations	Corporation Class 170	No. of corporations	Corporation Class 171
8	$455,610	62	$243,253,456	104	$16,745,936	11	$557,625	4	$160,506	56	$3,065,923
8	$285,119	62	$5,509,153	104	$12,031,976	11	$384,945	4	$10,329	56	$1,198,632
0	------------	5	$12,658	12	$36,136	1	$5,062	2	$3,989	11	$45,244
	------------		2,306		11,259		538		------------		3,289
	------------		53,200		94,400		8		490		58,040
	------------		125,500		296,533		387		490		82,850
	------------		16,750		18,500		750		2,000		13,000
	------------		201		222		9		24		156
	------------		1,655		3,917		------------		18		818
	------------		70		305		10		95		360
2	$24,113	3	$36,372	9	$141,722	2	$32,043	0	------------	5	$67,667
	796		1,133		35,071		------------		------------		2,150
	13,060		35		38,255		2,300		------------		65,640
	71,000		------------		36,845		------------		------------		47,250
	2,000		2,750		31,750		2,750		------------		10,250
	24		33		381		33		------------		123
	377		50		4,425		110		------------		1,531
	40		50		145		30		------------		270
2	$65,326	13	$456,543	20	$688,703	1	$42,449	1	$43,159	7	$213,331
	1,288		3,319		85,515		38,749		811		21,094
	2,525		35,495		620,180		8,535		------------		94,901
	1,943		61,081		1,026,409		11,960		------------		149,534
	3,000		22,250		60,250		3,000		1,500		20,750
	36		267		723		36		18		249
	123		1,452		18,408		248		329		3,278
	20		255		610		10		20		160
0	------------	13	$1,153,950	18	$1,816,108	5	$339,493	1	$70,031	13	$1,181,160
	------------		54,427		159,298		7,886		3,677		45,462
	------------		207,798		605,440		34,930		4,708		296,651
	------------		409,445		913,703		8,500		------------		311,250
	------------		49,750		119,250		11,250		3,000		47,500
	------------		597		1,431		135		36		570
	------------		6,574		35,676		2,204		205		10,403
	------------		270		600		220		20		475
0	------------	6	$1,405,783	7	$1,557,542	2	$759,708	0	------------	7	$1,357,374
	------------		14,793		328,133		16,705		------------		53,066
	------------		117,772		408,944		58,780		------------		135,450
	------------		197,155		290,887		162,175		------------		160,135
	------------		42,500		78,500		21,500		------------		37,000
	------------		510		942		258		------------		444
	------------		3,903		13,135		1,923		------------		6,890
	------------		350		960		60		------------		470
2	$1,178,186	16	$36,838,327	7	$14,722,600	0	------------	0	------------	2	$4,920,141
	33,653		2,571,120		959,465		------------		------------		484,674
	6,498		614,281		2,528,484		------------		------------		176,568
	8,426		1,106,892		381,656		------------		------------		449,441
	17,000		399,000		548,500		------------		------------		41,000
	204		4,788		6,582		------------		------------		492
	3,702		246,443		271,782		------------		------------		20,316
	125		2,595		1,700		------------		------------		150
2	------------	6	------------	31	------------	0	------------	0	------------	11	------------
	------------		$1,145		$853,573		------------		------------		$900
	------------		5,500		182,000		------------		------------		36,250
	$1,750		5,750		128,000		------------		------------		9,750
	21		69		1,536		------------		------------		117
	------------		------------		10		------------		------------		30
	70		130		1,005		------------		------------		715
8	$23,750	62	$538,750	104	$984,750	11	$39,250	4	$6,500	56	$179,250
	285		6,465		11,817		471		78		2,151
2	$46,412	16	$2,784,706	19	$559,599	5	$232,417	2	$3,989	8	$299,036

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Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 172	No. of corporations	Corporation Class 173	No. of corporations	Corporation Class 174
Total amount paid in for stock	8	$41,393	20	$1,890,683	6	$70,370
Total debt	8	$23,762	20	$3,629,787	6	$15,008
Showing gross receipts not exceeding $10,000	4	$18,913	2	$16,530	3	$17,736
Net profits reported		1,220		534		4,168
Assessed value		41,327		200		324
Actual value reported		9,489		3,154		900
Franchise assessment		4,000		2,000		3,000
Franchise tax		48		24		36
Total tax reported		1,253		231		185
License tax (levied since 1915)		65		85		45
Showing gross receipts from $10,000 to $20,000	0	----------	0	----------	1	$18,560
Net profits reported		----------		----------		----------
Assessed value		----------		----------		2,490
Actual value reported		----------		----------		4,700
Franchise assessment		----------		----------		1,000
Franchise tax		----------		----------		12
Total tax reported		----------		----------		80
License tax (levied since 1915)		----------		----------		20
Showing gross receipts from $20,000 to $50,000	1	$20,450	2	$85,828	1	$29,448
Net profits reported		550		8,436		----------
Assessed value		900		5,995		34
Actual value reported		----------		9,760		2,480
Franchise assessment		1,250		4,750		2,500
Franchise tax		15		57		30
Total tax reported		28		1,143		96
License tax (levied since 1915)		20		40		20
Showing gross receipts from $50,000 to $150,000	1	$50,416	6	$575,227	0	----------
Net profits reported		1,693		6,411		----------
Assessed value		4,500		50,947		----------
Actual value reported		4,500		96,007		----------
Franchise assessment		1,750		17,500		----------
Franchise tax		21		210		----------
Total tax reported		178		17,014		----------
License tax (levied since 1915)		10		105		----------
Showing gross receipts from $150,000 to $500,000	0	----------	4	$1,076,518	0	----------
Net profits reported		----------		27,559		----------
Assessed value		----------		60,950		----------
Actual value reported		----------		120,798		----------
Franchise assessment		----------		27,000		----------
Franchise tax		----------		324		----------
Total tax reported		----------		1,724		----------
License tax (levied since 1915)		----------		80		----------
Showing gross receipts exceeding $500,000	0	----------	3	$4,515,259	0	----------
Net profits reported		----------		29,108		----------
Assessed value		----------		645,305		----------
Actual value reported		----------		762,500		----------
Franchise assessment		----------		137,000		----------
Franchise tax		----------		1,644		----------
Total tax reported		----------		8,631		----------
License tax (levied since 1915)		----------		190		----------
Inoperative corporations	2	----------	3	----------	1	----------
Assessed value		----------		----------		----------
Actual value reported		----------		----------		----------
Franchise assessment		$1,250		$5,500		$750
Franchise tax		15		66		9
Total tax reported		----------		1,658		----------
License tax (levied since 1915)		110		135		20
Total franchise assessment	8	$8,250	20	$193,750	6	$7,250
Total franchise tax		99		2,325		87
Gross receipts of corporations reporting no profits	1	$2,016	7	$4,291,202	3	$50,030

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 175	No. of corporations	Corporation Class 176	No. of corporations	Corporation Class 177	No. of corporations	Corporation Class 178	No. of corporations	Corporation Class 179	No. of corporations	Corporation Class 180
46	$9,750,278	35	$3,640,673	19	$166,235	9	$117,000	43	$3,687,487	69	$3,402,817
46	$8,332,010	35	$1,631,649	19	$21,835	9	$65,958	43	$6,888,236	69	$824,283
3	$12,279	12	$21,478	11	$49,600	1	$10,000	7	$26,748	22	$111,356
	212		4,203		431		600		1,256		14,938
	12,610		35,665		-----------		-----------		13,855		147,255
	29,094		49,680		4,504		3,000		17,900		225,542
	4,000		14,750		10,750		1,000		5,750		22,000
	48		177		129		12		69		264
	266		2,081		351		7		112		3,036
	65		295		145		10		195		340
1	$14,239	2	$31,790	2	$23,313	1	$15,456	0	-----------	13	$190,522
	531		-----------		1,623		2,744		-----------		18,404
	-----------		22,965		-----------		535		-----------		56,315
	-----------		81,869		-----------		1,200		-----------		134,955
	1,000		2,250		2,000		1,500		-----------		24,250
	12		27		24		18		-----------		291
	-----------		471		-----------		34		-----------		4,015
	50		40		30		10		-----------		475
7	$233,036	3	$78,306	2	$58,341	3	$115,988	12	$403,934	10	$339,207
	18,083		4,750		1,692		3,282		8,266		48,999
	51,316		62,830		-----------		5,725		83,020		28,090
	74,626		85,150		50		10,435		57,558		84,040
	14,750		19,000		2,250		4,500		18,000		22,500
	177		228		27		54		216		270
	2,470		4,053		9		440		2,781		5,086
	125		350		30		40		260		285
8	$763,000	0	-----------	1	$93,565	2	$157,875	9	$690,654	11	$944,530
	11,731		-----------		-----------		656		15,804		54,843
	724,138		-----------		1,000		18,589		34,130		188,006
	100,132		-----------		1,000		18,589		132,744		446,807
	37,750		-----------		2,000		5,250		27,500		53,250
	453		-----------		24		63		330		639
	3,519		-----------		33		221		2,634		7,203
	175		-----------		20		35		220		285
11	$3,066,527	1	$287,727	0	-----------	1	$374,188	5	$1,237,183	2	$378,904
	102,788		37,915		-----------		-----------		134,821		31,659
	236,198		-----------		-----------		42,220		365,095		3,900
	557,308		-----------		-----------		121,757		863,510		49,035
	70,000		4,500		-----------		10,000		117,000		28,500
	840		54		-----------		120		1,404		342
	11,562		209		-----------		1,346		11,428		557
	300		25		-----------		20		185		125
8	$28,864,029	1	$539,149	0	-----------	0	-----------	5	$11,485,086	0	-----------
	1,337,643		115,151		-----------		-----------		571,071		-----------
	2,026,880		500		-----------		-----------		784,887		-----------
	2,667,961		500		-----------		-----------		585,216		-----------
	728,500		4,500		-----------		-----------		288,000		-----------
	8,742		54		-----------		-----------		3,456		-----------
	101,457		6,736		-----------		-----------		51,416		-----------
	1,245		100		-----------		-----------		410		-----------
8	-----------	16	-----------	3	-----------	1	-----------	5	-----------	11	-----------
	$11,499		$4,885		-----------		-----------		-----------		$97,935
	11,184		78,650		-----------		-----------		-----------		89,803
	10,500		15,250		$2,250		$1,000		$4,000		9,750
	126		183		27		12		48		117
	25		153		-----------		-----------		-----------		5
	185		1,050		65		10		80		165
46	$866,500	35	$60,250	19	$19,250	9	$23,250	43	$460,250	69	$160,250
	10,398		723		231		279		5,523		1,923
10	$607,929	11	$88,670	10	$133,184	2	$477,037	18	$785,985	17	$584,198

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 181	No. of corporations	Corporation Class 182	No. of corporations	Corporation Class 183
Total amount paid in for stock	13	$210,752	6	$484,363	21	$1,158,042
Total debt	13	$267,887	6	$959,907	21	$1,394,687
Showing gross receipts not exceeding $10,000	2	$6,104	1	$9,634	2	$11,829
Net profits reported		----------		1,303		----------
Assessed value		2,900		6,900		375
Actual value reported		6,913		10,500		375
Franchise assessment		2,000		2,500		2,000
Franchise tax		24		30		24
Total tax reported		75		281		77
License tax (levied since 1915)		40		20		20
Showing gross receipts from $10,000 to $20,000	4	$62,059	1	$15,599	7	$108,273
Net profits reported		5,517		356		14,596
Assessed value		3,735		----------		10,190
Actual value reported		13,180		----------		11,157
Franchise assessment		5,750		1,500		10,500
Franchise tax		69		18		126
Total tax reported		551		15		546
License tax (levied since 1915)		150		10		230
Showing gross receipts from $20,000 to $50,000	1	$20,809	0	----------	2	$65,882
Net profits reported		----------		----------		3,773
Assessed value		----------		----------		7,850
Actual value reported		----------		----------		----------
Franchise assessment		1,000		----------		3,500
Franchise tax		12		----------		42
Total tax reported		10		----------		393
License tax (levied since 1915)		20		----------		40
Showing gross receipts from $50,000 to $150,000	4	$337,112	1	$69,594	4	$275,221
Net profits reported		5,676		----------		26,105
Assessed value		17,715		8,400		39,577
Actual value reported		40,343		25,000		12,569
Franchise assessment		8,250		2,000		13,500
Franchise tax		99		24		162
Total tax reported		535		361		1,317
License tax (levied since 1915)		70		75		80
Showing gross receipts from $150,000 to $500,000	0	----------	1	$237,194	0	----------
Net profits reported		----------		----------		----------
Assessed value		----------		21,445		----------
Actual value reported		----------		21,556		----------
Franchise assessment		----------		6,000		----------
Franchise tax		----------		72		----------
Total tax reported		----------		1,558		----------
License tax (levied since 1915)		----------		20		----------
Showing gross receipts exceeding $500,000	0	----------	2	$2,563,046	1	$3,252,575
Net profits reported		----------		11,553		485,051
Assessed value		----------		475,775		42,743
Actual value reported		----------		864,815		74,645
Franchise assessment		----------		90,000		16,500
Franchise tax		----------		1,080		198
Total tax reported		----------		16,603		24,123
License tax (levied since 1915)		----------		100		100
Inoperative corporations	2	----------	0	----------	5	----------
Assessed value		$900		----------		$10,415
Actual value reported		2,500		----------		----------
Franchise assessment		1,250		----------		9,500
Franchise tax		15		----------		114
Total tax reported		----------		----------		----------
License tax (levied since 1915)		30		----------		80
Total franchise assessment	13	$18,250	6	$102,000	21	$55,500
Total franchise tax		219		1,224		666
Gross receipts of corporations reporting no profits	3	$26,913	2	$306,788	5	$66,134

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 184	No. of corporations	Corporation Class 185	No. of corporations	Corporation Class 186	No. of corporations	Corporation Class 187	No. of corporations	Corporation Class 188	No. of corporations	Corporation Class 189
6	$1,159,420	10	$316,915	31	$1,222,748	15	$760,106	102	$8,317,546	4	$6,080
6	$39,509	10	$205,177	31	$4,139,386	15	$2,139,194	102	$545,636	4	$9,844
2	$6,780	1	$628	2	$8,782	0	----------	26	$51,877	2	$10,924
	21		----------		----------		----------		10,726		1,064
	75,800		----------		6,740		----------		16,545		1,452
	61,215		1,350		10,600		----------		8,245		1,100
	2,000		750		2,500		----------		27,750		2,000
	24		9		30		----------		333		24
	248		----------		333		----------		429		23
	45		10		45		----------		845		30
1	$10,069	1	$19,500	8	$130,061	0	----------	3	$50,073	1	$18,577
	----------		----------		2,703		----------		13,329		86
	----------		2,000		16,504		----------		500		----------
	----------		3,000		19,522		----------		10,214		----------
	1,750		1,000		12,000		----------		8,000		1,000
	21		12		144		----------		96		12
	465		265		631		----------		221		49
	50		15		105		----------		105		15
0	----------	1	$26,150	8	$262,361	3	$110,694	1	$24,434	0	----------
	----------		----------		7,307		26,522		15,164		----------
	----------		525		22,108		8,895		----------		----------
	----------		775		53,428		19,529		----------		----------
	----------		1,250		12,000		11,250		15,000		----------
	----------		15		144		135		180		----------
	----------		16		1,189		508		363		----------
	----------		20		140		40		50		----------
2	$161,991	4	$423,179	9	$663,476	1	$133,925	1	$62,132	1	$83,671
	23,184		6,727		12,947		19,624		343		180
	40,310		47,810		42,849		----------		350		1,800
	38,500		96,171		18,000		----------		350		11,500
	18,750		12,000		21,250		6,500		1,500		2,000
	225		144		255		78		18		24
	3,701		1,433		2,223		15		28		45
	220		90		160		20		10		25
0	----------	3	$930,768	1	$164,984	6	$1,777,235	0	----------	0	----------
	----------		44,551		----------		95,854		----------		----------
	----------		91,876		34,861		433,687		----------		----------
	----------		65,346		99,447		1,086,751		----------		----------
	----------		35,000		5,000		97,500		----------		----------
	----------		420		60		1,170		----------		----------
	----------		4,677		888		13,822		----------		----------
	----------		70		25		320		----------		----------
0	----------	0	----------	2	$1,216,634	2	$4,586,911	0	----------	0	----------
	----------		----------		5,844		267,396		----------		----------
	----------		----------		96,513		726,360		----------		----------
	----------		----------		181,282		1,015,000		----------		----------
	----------		----------		32,000		200,000		----------		----------
	----------		----------		384		2,400		----------		----------
	----------		----------		4,970		18,851		----------		----------
	----------		----------		125		250		----------		----------
1	----------	0	----------	1	----------	3	----------	71	----------	0	----------
	----------		----------		$8,000		----------		$5,684		----------
	$5,250		----------		8,000		----------		5,595		----------
	500		----------		4,500		$2,500		62,000		----------
	6		----------		54		30		744		----------
	----------		----------		----------		----------		779		----------
	10		----------		50		30		3,990		----------
6	$23,000	10	$50,000	31	$89,250	15	$317,750	102	$114,250	4	$5,000
	276		600		1,071		3,813		1,371		60
3	$126,585	4	$171,116	16	$1,196,908	1	$26,264	17	$41,377	0	----------

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 190	No. of corporations	Corporation Class 191	No. of corporations	Corporation Class 192
Total amount paid in for stock	4	$81,230	32	$1,346,305	11	$1,025,662
Total debt	4	$32,460	32	$382,975	11	$903,658
Showing gross receipts not exceeding $10,000	0	----------	7	$9,540	0	----------
Net profits reported		----------		4,449		----------
Assessed value		----------		43,060		----------
Actual value reported		----------		67,400		----------
Franchise assessment		----------		10,250		----------
Franchise tax		----------		123		----------
Total tax reported		----------		1,252		----------
License tax (levied since 1915)		----------		180		----------
Showing gross receipts from $10,000 to $20,000	1	$17,634	1	$16,759	1	$12,857
Net profits reported		3,961		----------		5,144
Assessed value		----------		950		----------
Actual value reported		----------		2,987		----------
Franchise assessment		1,750		1,000		2,000
Franchise tax		21		12		24
Total tax reported		48		13		----------
License tax (levied since 1915)		10		10		20
Showing gross receipts from $20,000 to $50,000	0	----------	6	$198,233	2	$52,310
Net profits reported		----------		24,875		----------
Assessed value		----------		12,043		1,000
Actual value reported		----------		24,618		----------
Franchise assessment		----------		10,000		2,500
Franchise tax		----------		120		30
Total tax reported		----------		933		21
License tax (levied since 1915)		----------		285		35
Showing gross receipts from $50,000 to $150,000	2	$146,832	13	$1,083,402	3	$271,490
Net profits reported		356		53,764		2,510
Assessed value		2,040		145,220		80,209
Actual value reported		4,080		254,196		77,414
Franchise assessment		5,250		44,750		11,000
Franchise tax		63		537		132
Total tax reported		309		6,679		1,168
License tax (levied since 1915)		25		300		55
Showing gross receipts from $150,000 to $500,000	1	$278,432	3	$808,137	3	$979,403
Net profits reported		25,562		2,620		80,208
Assessed value		20,100		77,265		191,840
Actual value reported		111,825		263,368		199,350
Franchise assessment		8,500		21,000		26,500
Franchise tax		102		252		318
Total tax reported		843		2,310		5,754
License tax (levied since 1915)		25		100		125
Showing gross receipts exceeding $500,000	0	----------	0	----------	2	$1,464,545
Net profits reported		----------		----------		22,197
Assessed value		----------		----------		146,221
Actual value reported		----------		----------		461,750
Franchise assessment		----------		----------		50,000
Franchise tax		----------		----------		600
Total tax reported		----------		----------		8,139
License tax (levied since 1915)		----------		----------		100
Inoperative corporations	0	----------	2	----------	0	----------
Assessed value		----------		----------		----------
Actual value reported		----------		----------		----------
Franchise assessment		----------		$2,750		----------
Franchise tax		----------		33		----------
Total tax reported		----------		128		----------
License tax (levied since 1915)		----------		25		----------
Total franchise assessment	4	$15,500	32	$89,750	11	$92,000
Total franchise tax		186		1,077		1,104
Gross receipts of corporations reporting no profits	0	----------	13	$955,228	4	$536,004

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 193	No. of corporations	Corporation Class 194	No. of corporations	Corporation Class 195	No. of corporations	Corporation Class 196	No. of corporations	Corporation Class 197	No. of corporations	Corporation Class 198
37	$810,271	4	$354,920	84	$1,653,616	100	$3,276,375	182	$8,309,039	31	$6,343,303
37	$375,780	4	$199,000	84	$1,006,180	100	$1,937,246	182	$9,950,365	31	$1,623,318
5	$24,647	1	$498	5	$23,171	8	$22,471	51	$229,550	9	$37,690
	630		----------		1,493		1,405		24,794		2,230
	480		----------		1,085		6,015		111,847		----------
	1,098		2,000		54,700		9,470		109,275		5,219
	4,750		1,000		4,500		7,750		47,000		9,000
	57		12		54		93		564		108
	327		----------		86		356		2,664		94
	60		10		80		135		670		155
2	$36,859	1	$13,161	21	$326,461	3	$37,804	38	$536,120	3	$53,648
	4,432		1,893		11,433		----------		30,815		649
	----------		6,000		31,323		3,711		150,418		3,239
	----------		----------		37,359		----------		132,123		613
	3,000		1,000		24,750		3,250		47,750		4,500
	36		12		297		39		573		54
	54		240		1,190		217		5,534		116
	30		20		375		55		950		50
12	$439,325	1	$33,982	33	$1,142,991	13	$399,891	36	$1,122,547	2	$56,648
	10,848		----------		47,689		9,788		80,212		1,510
	57,175		28,590		112,674		66,259		84,670		805
	24,525		352,000		166,721		82,139		205,682		242,630
	21,000		6,500		59,750		24,750		59,500		2,750
	252		78		717		297		714		33
	1,340		2,648		4,902		1,632		5,211		192
	175		75		980		250		625		35
10	$800,884	1	$70,300	18	$1,417,571	29	$2,840,143	26	$2,263,812	7	$576,958
	24,357		----------		54,626		177,991		189,903		44,840
	152,534		----------		163,786		53,766		195,705		57,138
	293,584		15,000		275,538		106,383		373,589		55,648
	45,500		2,000		52,000		107,500		100,750		24,250
	546		24		624		1,290		1,209		291
	3,861		150		5,225		6,525		9,629		5,708
	240		10		420		600		570		265
3	$649,911	0	----------	5	$1,034,427	21	$5,824,391	6	$1,456,556	2	$635,963
	30,366		----------		37,174		49,916		82,128		25,015
	36,800		----------		220,000		193,522		300,191		74,614
	79,761		----------		308,580		242,147		692,600		223,488
	30,000		----------		31,500		105,250		56,000		30,000
	360		----------		378		1,263		672		360
	1,659		----------		8,279		5,295		11,582		3,067
	75		----------		150		510		260		100
0	----------	0	----------	0	----------	18	$19,401,781	8	$10,812,867	4	$7,373,641
	----------		----------		----------		374,080		1,363,818		201,531
	----------		----------		----------		611,508		1,116,069		800
	----------		----------		----------		534,861		968,057		10,000
	----------		----------		----------		390,500		402,500		15,500
	----------		----------		----------		4,686		4,830		186
	----------		----------		----------		26,711		48,779		30,320
	----------		----------		----------		560		595		510
5	----------	0	----------	2	----------	8	----------	17	----------	4	----------
	----------		----------		----------		$2,100		$8,700		$10,480
	----------		----------		$14,000		4,100		35,000		----------
	$8,750		----------		1,500		8,500		14,000		3,250
	105		----------		18		102		168		39
	10		----------		----------		40,736		----------		10
	260		----------		25		2,230		380		65
37	$113,000	4	$10,500	84	$174,000	100	$647,500	182	$727,500	31	$89,250
	1,356		126		2,088		7,770		8,730		1,071
11	$390,987	3	$104,780	23	$862,059	34	$5,164,651	60	$2,848,518	9	$1,618,771

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 199	No. of corporations	Corporation Class 200	No. of corporations	Corporation Class 201
Total amount paid in for stock	46	$11,448,616	623	$32,867,671	402	$9,042,009
Total debt	46	$1,186,317	623	$21,874,888	402	$6,709,351
Showing gross receipts not exceeding $10,000	11	$33,008	316	$964,994	310	$764,623
Net profits reported		7,047		165,295		167,870
Assessed value		87,171		3,217,839		3,361,488
Actual value reported		153,951		5,146,070		5,126,670
Franchise assessment		14,000		452,750		169,750
Franchise tax		168		5,433		2,037
Total tax reported		2,218		94,708		115,416
License tax (levied since 1915)		405		7,390		6,520
Showing gross receipts from $10,000 to $20,000	1	$19,120	99	$1,396,270	16	$215,004
Net profits reported		-----------		172,517		13,588
Assessed value		19,650		2,893,589		558,936
Actual value reported		23,700		5,576,782		810,020
Franchise assessment		1,500		339,750		9,500
Franchise tax		18		4,077		114
Total tax reported		379		98,679		33,139
License tax (levied since 1915)		50		3,210		465
Showing gross receipts from $20,000 to $50,000	5	$126,228	48	$1,466,392	15	$431,173
Net profits reported		2,095		288,176		56,417
Assessed value		19,782		4,170,286		1,719,313
Actual value reported		39,796		3,782,339		2,349,406
Franchise assessment		7,000		395,500		17,250
Franchise tax		84		4,746		207
Total tax reported		6,661		114,464		48,324
License tax (levied since 1915)		115		2,560		900
Showing gross receipts from $50,000 to $150,000	7	$627,055	28	$2,133,306	2	$145,137
Net profits reported		36,345		266,147		2,682
Assessed value		148,539		2,342,518		54,090
Actual value reported		330,487		4,741,845		300,318
Franchise assessment		33,000		304,750		1,000
Franchise tax		396		3,657		12
Total tax reported		4,780		89,706		3,264
License tax (levied since 1915)		195		1,745		20
Showing gross receipts from $150,000 to $500,000	8	$1,854,783	6	$2,137,594	0	-----------
Net profits reported		194,354		241,583		-----------
Assessed value		181,266		1,871,721		-----------
Actual value reported		333,170		3,096,622		-----------
Franchise assessment		55,500		147,500		-----------
Franchise tax		666		1,770		-----------
Total tax reported		5,324		54,999		-----------
License tax (levied since 1915)		215		290		-----------
Showing gross receipts exceeding $500,000	1	$4,851,895	0	-----------	0	-----------
Net profits reported		605,184		-----------		-----------
Assessed value		92,421		-----------		-----------
Actual value reported		153,703		-----------		-----------
Franchise assessment		30,000		-----------		-----------
Franchise tax		360		-----------		-----------
Total tax reported		87,927		-----------		-----------
License tax (levied since 1915)		800		-----------		-----------
Inoperative corporations	13	-----------	126	-----------	59	-----------
Assessed value		$28,930		$371,359		$185,299
Actual value reported		68,658		395,400		568,429
Franchise assessment		12,250		135,000		30,750
Franchise tax		147		1,620		369
Total tax reported		420		5,259		2,270
License tax (levied since 1915)		590		4,895		1,415
Total franchise assessment	46	$153,250	623	$1,775,250	402	$228,250
Total franchise tax		1,839		21,303		2,739
Gross receipts of corporations reporting no profits	17	$1,358,261	241	$2,648,913	118	$572,250

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 202	No. of corporations	Corporation Class 203	No. of corporations	Corporation Class 204	No. of corporations	Corporation Class 205	No. of corporations	Corporation Class 206	No. of corporations	Corporation Class 207
526	$108,038,994	142	$8,005,315	2143	$390,097,810	90	$18,805,772	41	$3,086,687	8	$68,510
526	$30,337,971	142	$5,828,159	2143	$226,597,403	90	$954,160	41	$1,867,563	8	$285,358
237	$888,632	77	$218,476	1120	$3,136,370	7	$27,311	9	$46,453	1	$6,247
	274,363		35,842		620,165		1,643		7,634		----------
	7,896,485		762,579		32,468,156		32,700		77,630		----------
	11,501,690		1,926,607		49,250,490		5,000		93,290		----------
	556,000		110,750		2,445,500		6,500		13,500		1,000
	6,672		1,329		29,346		78		162		12
	194,631		22,890		810,432		1,026		1,253		82
	7,820		6,055		40,135		110		245		10
83	$1,188,620	19	$286,105	224	$3,144,432	4	$65,492	4	$60,318	0	----------
	389,952		31,527		627,991		62		2,617		----------
	6,695,442		531,139		14,657,427		1,900		650		----------
	9,052,215		1,312,928		26,808,656		1,500		3,350		----------
	509,000		50,250		1,267,250		4,000		5,750		----------
	6,108		603		15,207		48		69		----------
	167,635		13,841		393,183		247		99		----------
	3,085		600		12,215		65		125		----------
81	$2,597,739	15	$461,461	232	$7,354,628	21	$736,731	8	$243,153	1	$38,810
	953,137		33,393		1,509,101		25,482		9,714		----------
	16,782,267		655,242		31,838,745		20,000		32,805		4,483
	21,064,746		997,308		43,023,355		33,500		30,370		7,500
	1,347,500		94,250		2,549,000		31,000		13,250		1,250
	16,170		1,131		30,588		372		159		15
	412,651		13,404		815,704		3,344		768		135
	5,590		835		14,210		255		205		20
65	$4,924,700	9	$756,644	139	$11,462,364	28	$2,348,585	11	$981,775	3	$280,785
	1,858,052		57,762		1,862,665		70,391		133,502		2,118
	24,398,824		435,700		40,233,765		61,625		86,803		40,395
	33,037,324		1,284,170		57,759,571		116,250		81,019		47,375
	2,283,250		62,250		3,569,000		75,500		75,000		10,000
	27,399		747		42,828		906		900		120
	629,712		10,934		1,138,893		6,830		3,274		1,437
	4,530		540		10,770		490		325		60
14	$3,327,282	2	$512,605	48	$11,285,869	17	$4,828,223	3	$743,062	2	$584,595
	831,367		284		1,819,512		140,374		11,894		1,327
	14,219,955		413,460		26,336,927		135,407		331,368		33,482
	10,092,155		878,113		38,033,855		190,590		90,450		18,000
	1,428,000		66,000		2,894,500		132,750		52,000		18,500
	17,136		792		34,734		1,593		624		222
	401,469		18,336		685,720		51,639		8,221		764
	2,540		200		6,925		535		150		30
1	$576,463	1	$903,855	12	$21,320,472	4	$8,616,365	0	----------	0	----------
	526,455		----------		1,707,445		326,823		----------		----------
	483,000		119,145		22,818,433		62,395		----------		----------
	315,332		133,196		20,089,698		213,519		----------		----------
	333,500		20,000		2,184,500		64,500		----------		----------
	4,002		240		26,214		774		----------		----------
	39,174		2,847		708,618		8,957		----------		----------
	100		100		2,905		1,250		----------		----------
45	----------	19	----------	368	----------	9	----------	6	----------	1	----------
	$262,224		$51,550		$6,890,094		----------		$5,385		----------
	440,265		83,572		11,517,998		$1,000		4,050		----------
	50,000		17,750		732,500		8,750		5,500		$500
	600		213		8,790		105		66		6
	2,984		810		94,355		----------		165		----------
	2,725		665		18,010		200		205		20
526	$6,507,250	142	$421,250	2143	$15,642,250	90	$323,000	41	$165,000	8	$31,250
	78,087		5,055		187,707		3,876		1,980		375
117	$2,011,866	57	$1,867,158	869	$15,894,427	36	$2,991,751	12	$194,367	5	$643,824

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 208	No. of corporations	Corporation Class 209	No. of corporations	Corporation Class 210
Total amount paid in for stock	6	$27,530,000	68	$1,072,492	22	$745,982
Total debt	6	$42,352	68	$497,503	22	$712,054
Showing gross receipts not exceeding $10,000	2	$12,787	27	$120,868	3	$17,901
Net profits reported		93		19,286		-----------
Assessed value		-----------		66,059		2,885
Actual value reported		-----------		65,268		15,014
Franchise assessment		2,000		23,750		3,000
Franchise tax		24		285		36
Total tax reported		10		2,456		44
License tax (levied since 1915)		40		505		40
Showing gross receipts from $10,000 to $20,000	1	$14,949	4	$58,493	6	$82,534
Net profits reported		-----------		717		2,373
Assessed value		3,935		2,685		22,503
Actual value reported		3,935		3,485		91,409
Franchise assessment		1,250		5,000		7,500
Franchise tax		15		60		90
Total tax reported		88		162		603
License tax (levied since 1915)		20		65		125
Showing gross receipts from $20,000 to $50,000	0	-----------	12	$378,404	5	$125,564
Net profits reported		-----------		19,010		3,303
Assessed value		-----------		82,240		5,200
Actual value reported		-----------		105,628		8,022
Franchise assessment		-----------		21,250		7,250
Franchise tax		-----------		255		87
Total tax reported		-----------		10,790		537
License tax (levied since 1915)		-----------		220		65
Showing gross receipts from $50,000 to $150,000	1	$87,286	6	$363,176	7	$611,263
Net profits reported		3,322		57,391		13,742
Assessed value		-----------		416,525		96,375
Actual value reported		-----------		374,362		55,433
Franchise assessment		2,250		19,000		20,500
Franchise tax		27		228		246
Total tax reported		537		7,897		3,044
License tax (levied since 1915)		25		120		180
Showing gross receipts from $150,000 to $500,000	0	-----------	1	$190,044	0	-----------
Net profits reported		-----------		6,026		-----------
Assessed value		-----------		18,798		-----------
Actual value reported		-----------		50,825		-----------
Franchise assessment		-----------		5,000		-----------
Franchise tax		-----------		60		-----------
Total tax reported		-----------		-----------		-----------
License tax (levied since 1915)		-----------		50		-----------
Showing gross receipts exceeding $500,000	0	-----------	0	-----------	1	$591,351
Net profits reported		-----------		-----------		20,169
Assessed value		-----------		-----------		52,750
Actual value reported		-----------		-----------		117,225
Franchise assessment		-----------		-----------		15.000
Franchise tax		-----------		-----------		180
Total tax reported		-----------		-----------		1,811
License tax (levied since 1915)		-----------		-----------		50
Inoperative corporations	2	-----------	18	-----------	0	-----------
Assessed value		-----------		$44,750		-----------
Actual value reported		-----------		256,450		-----------
Franchise assessment		$3,000		11,750		-----------
Franchise tax		36		141		-----------
Total tax reported		18		74		-----------
License tax (levied since 1915)		75		285		-----------
Total franchise assessment	6	$8,500	68	$85,750	22	$53,250
Total franchise tax		102		1,029		639
Gross receipts of corporations reporting no profits	2	$19,096	21	$304,217	8	$194,239

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 211	No. of corporations	Corporation Class 212	No. of corporations	Corporation Class 213	No. of corporations	Corporation Class 214	No. of corporations	Corporation Class 215	No. of corporations	Corporation Class 216
7	$322,000	4	$46,339	20	$3,086,910	30	$6,693,151	19	$387,084	8	$1,121,075
7	$72,630	4	$3,657	20	$1,374,363	30	$4,096,728	19	$116,370	8	$122,426
0	-----------	2	$2,312	3	$14,150	2	$2,966	4	$4,110	0	-----------
	-----------		534		650		208		552		-----------
	-----------		2,590		3,500		250		-----------		-----------
	-----------		1,500		5,250		545		-----------		-----------
	-----------		2,500		2,750		1,750		4,000		-----------
	-----------		30		33		21		48		-----------
	-----------		128		422		35		42		-----------
	-----------		40		45		30		65		-----------
0	-----------	1	$11,964	1	$18,263	4	$56,233	2	$31,378	0	-----------
	-----------		540		-----------		1,587		904		-----------
	-----------		-----------		105,450		1,294		3,500		-----------
	-----------		-----------		-----------		6,300		10,528		-----------
	-----------		1,000		6,000		4,250		1,750		-----------
	-----------		12		72		51		21		-----------
	-----------		-----------		2,542		686		85		-----------
	-----------		100		25		50		30		-----------
0	-----------	1	$42,367	2	$70,236	6	$218,450	6	$180,655	1	$42,310
	-----------		1,345		121		7,157		5,394		9,634
	-----------		-----------		9,770		13,085		27,340		625
	-----------		9,380		35,700		28,231		46,916		625
	-----------		2,250		3,000		8,500		9,500		5,000
	-----------		27		36		102		114		60
	-----------		298		463		420		1,058		83
	-----------		10		75		100		110		25
1	$143,488	0	-----------	1	$62,273	7	$664,946	2	$125,791	1	$69,219
	-----------		-----------		19,434		35,710		2,333		967
	14,758		-----------		5,575		62,585		9,230		1,252
	213,000		-----------		5,750		64,284		7,000		1,800
	5,000		-----------		6,000		20,500		4,000		1,750
	60		-----------		72		246		48		21
	553		-----------		377		4,340		366		80
	20		-----------		25		130		35		10
6	$1,329,104	0	-----------	0	-----------	6	$1,424,385	3	$827,723	5	$1,473,087
	40,417		-----------		-----------		34,816		14,101		146,296
	77,337		-----------		-----------		173,362		97,520		1,294,885
	60,492		-----------		-----------		249,623		157,169		1,288,476
	33,500		-----------		-----------		40,000		21,000		122,500
	402		-----------		-----------		480		252		1,470
	3,588		-----------		-----------		6,060		6,142		3,622
	155		-----------		-----------		130		50		245
0	-----------	0	-----------	2	$6,791,835	4	$7,347,439	0	-----------	0	-----------
	-----------		-----------		545,197		716,817		-----------		-----------
	-----------		-----------		609,957		227,280		-----------		-----------
	-----------		-----------		2,018,850		428,100		-----------		-----------
	-----------		-----------		221,000		145,000		-----------		-----------
	-----------		-----------		2,652		1,740		-----------		-----------
	-----------		-----------		25,102		37,409		-----------		-----------
	-----------		-----------		300		495		-----------		-----------
0	-----------	0	-----------	11	-----------	1	-----------	2	-----------	1	-----------
	-----------		-----------		$18,650		-----------		-----------		-----------
	-----------		-----------		16,300		-----------		-----------		-----------
	-----------		-----------		10,500		$500		$2,000		$750
	-----------		-----------		126		6		24		9
	-----------		-----------		54		-----------		-----------		-----------
	-----------		-----------		1,545		10		30		20
7	$38,500	4	$5,750	20	$249,250	30	$220,500	19	$42,250	8	$130,000
	462		69		2,991		2,646		507		1,560
1	$143,488	1	712	4	$63,487	4	$747,377	4	$245,197		-----------

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 217	No. of corporations	Corporation Class 218	No. of corporations	Corporation Class 219
Total amount paid in for stock	160	$31,380,180	35	$556,230	15	$1,008,449
Total debt	160	$17,514,836	35	$168,751	15	$586,698
Showing gross receipts not exceeding $10,000	51	$188,465	6	$20,961	1	$4,451
Net profits reported		39,789		742		72
Assessed value		1,672,895		3,000		----------
Actual value reported		1,723,108		21,592		----------
Franchise assessment		98,000		5,250		1,000
Franchise tax		1,176		63		12
Total tax reported		29,670		50		58
License tax (levied since 1915)		1,585		65		10
Showing gross receipts from $10,000 to $20,000	24	$354,663	7	$103,384	0	----------
Net profits reported		87,605		1,554		----------
Assessed value		968,066		21,332		----------
Actual value reported		1,320,183		32,205		----------
Franchise assessment		89,750		7,750		----------
Franchise tax		1,077		93		----------
Total tax reported		31,222		240		----------
License tax (levied since 1915)		770		100		----------
Showing gross receipts from $20,000 to $50,000	26	$796,253	10	$302,986	0	----------
Net profits reported		121,428		6,901		----------
Assessed value		2,351,691		49,520		----------
Actual value reported		2,681,131		95,208		----------
Franchise assessment		173,750		16,000		----------
Franchise tax		2,085		192		----------
Total tax reported		53,388		1,686		----------
License tax (levied since 1915)		795		175		----------
Showing gross receipts from $50,000 to $150,000	23	$1,850,815	7	$556,601	5	$344,948
Net profits reported		385,789		18,753		37,681
Assessed value		3,324,517		63,501		9,185
Actual value reported		7,987,183		58,215		17,550
Franchise assessment		412,750		20,500		15,500
Franchise tax		4,953		246		186
Total tax reported		136,270		2,138		587
License tax (levied since 1915)		1,500		140		70
Showing gross receipts from $150,000 to $500,000	7	$1,990,298	2	$427,772	5	$1,487,948
Net profits reported		538,788		15,539		21,517
Assessed value		1,549,119		13,000		66,347
Actual value reported		683,592		25,000		145,346
Franchise assessment		154,000		13,000		31,500
Franchise tax		1,848		156		378
Total tax reported		61,382		1,819		1,843
License tax (levied since 1915)		370		75		135
Showing gross receipts exceeding $500,000	2	$5,073,720	0	----------	3	$3,436,192
Net profits reported		161,597		----------		2,023
Assessed value		12,139,571		----------		85,282
Actual value reported		15,211,587		----------		113,870
Franchise assessment		1,164,500		----------		95,500
Franchise tax		13,974		----------		1,146
Total tax reported		246,264		----------		2,166
License tax (levied since 1915)		1,200		----------		120
Inoperative corporations	27	----------	3	----------	1	----------
Assessed value		$773,028		----------		----------
Actual value reported		931,066		----------		----------
Franchise assessment		44,750		$2,000		$750
Franchise tax		537		24		9
Total tax reported		7,045		----------		----------
License tax (levied since 1915)		1,055		50		10
Total franchise assessment	160	$2,137,500	35	$64,500	15	$144,250
Total franchise tax		25,650		774		1,731
Gross receipts of corporations reporting no profits	48	$2,839,981	17	$701,137	3	$3,176,133

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 220	No. of corporations	Corporation Class 221	No. of corporations	Corporation Class 222	No. of corporations	Corporation Class 223	No. of corporations	Corporation Class 224	No. of corporations	Corporation Class 225
11	$1,137,387	37	$2,943,022	10	$111,800	8	$210,300	7	$1,574,500	201	$76,289,735
11	$925,148	37	$4,819,419	10	$83,377	8	$74,227	7	$20,601	201	$22,740,782
0	-----------	5	$30,160	2	$7,989	6	$9,461	2	$10,582	39	$158,824
	-----------		9,818		441		518		-----------		28,428
	-----------		85,168		-----------		7,695		-----------		110,654
	-----------		85,625		6,000		8,800		1,465		57,870
	-----------		28,750		1,750		4,250		2,000		52,750
	-----------		345		21		51		24		633
	-----------		64		-----------		356		22		3,560
	-----------		80		20		145		20		1,150
0	-----------	5	$78,757	5	$75,096	0	-----------	2	$35,326	19	$301,220
	-----------		1,820		3,526		-----------		2,268		34,654
	-----------		1,450		1,690		-----------		100,750		116,774
	-----------		2,558		2,380		-----------		100,750		126,074
	-----------		5,500		6,500		-----------		2,500		39,750
	-----------		66		78		-----------		30		477
	-----------		199		1,214		-----------		1,024		3,069
	-----------		50		100		-----------		60		1,340
2	$62,501	4	$119,703	1	$22,000	1	$21,767	1	$49,237	28	$942,862
	2,451		-----------		226		-----------		4,000		70,027
	-----------		4,670		2,500		11,585		8,195		325,954
	-----------		9,500		7,500		20,500		9,770		741,564
	2,750		7,500		1,000		1,500		11,000		77,500
	33		90		12		18		132		930
	10		733		154		271		1,165		11,604
	20		85		10		50		45		835
2	$129,486	7	$449,390	1	$132,479	0	-----------	2	$164,015	43	$3,412,061
	5,675		4,728		1,407		-----------		23,701		249,285
	-----------		63,450		-----------		-----------		22,850		1,348,454
	6,225		64,368		-----------		-----------		32,500		1,683,637
	6,000		17,750		1,000		-----------		2,500		252,000
	72		213		12		-----------		30		3,024
	424		1,804		3		-----------		440		23,247
	25		140		25		-----------		20		2,985
2	$310,704	8	$2,058,152	0	-----------	0	-----------	0	-----------	15	$3,658,379
	6,386		22,338		-----------		-----------		-----------		503,548
	8,460		60,840		-----------		-----------		-----------		679,538
	19,891		112,389		-----------		-----------		-----------		1,309,499
	8,000		32,500		-----------		-----------		-----------		344,000
	96		390		-----------		-----------		-----------		4,128
	514		4,070		-----------		-----------		-----------		31,969
	40		155		-----------		-----------		-----------		735
2	$10,303,808	5	$26,382,837	0	-----------	0	-----------	0	-----------	13	$23,411,532
	182,914		2,141,501		-----------		-----------		-----------		2,240,492
	64,274		450,020		-----------		-----------		-----------		7,283,896
	10,329		101,722		-----------		-----------		-----------		13,491,500
	25,000		411,000		-----------		-----------		-----------		3,322,000
	300		4,932		-----------		-----------		-----------		39,864
	14,604		114,608		-----------		-----------		-----------		231,067
	110		725		-----------		-----------		-----------		4,060
3	-----------	3	-----------	1	-----------	1	-----------	0	-----------	44	-----------
	$350		-----------		$7,355		-----------		-----------		$3,682,921
	1,850		$13,210		-----------		-----------		-----------		377,444
	1,750		2,750		1,750		$1,000		-----------		180,500
	21		33		21		12		-----------		2,166
	-----------		-----------		-----------		10		-----------		4,330
	60		160		20		75		-----------		3,875
11	$43,500	37	$505,750	10	$12,000	8	$6,750	7	$18,000	201	$4,268,500
	522		6,069		144		81		216		51,222
1	$38,794	18	$1,543,218	3	$41,995	6	$28,550	3	$29,661	66	$10,884,882

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 226	No. of corporations	Corporation Class 227	No. of corporations	Corporation Class 228
Total amount paid in for stock	15	$531,665	55	$1,018,887	95	$2,262,922
Total debt	15	$5,657,976	55	$527,411	95	$855,048
Showing gross receipts not exceeding $10,000	0	-----	8	$50,724	16	$86,119
Net profits reported		-----		3,799		14,040
Assessed value		-----		11,310		21,075
Actual value reported		-----		35,780		54,056
Franchise assessment		-----		8,000		19,500
Franchise tax		-----		96		234
Total tax reported		-----		579		991
License tax (levied since 1915)		-----		150		220
Showing gross receipts from $10,000 to $20,000	1	$18,219	13	$185,412	13	$188,804
Net profits reported		-----		15,622		14,688
Assessed value		5,575		24,515		102,745
Actual value reported		-----		31,096		146,467
Franchise assessment		1,000		19,000		18,500
Franchise tax		12		228		222
Total tax reported		194		2,055		2,745
License tax (levied since 1915)		20		225		200
Showing gross receipts from $20,000 to $50,000	3	$100,519	23	$666,855	32	$1,013,203
Net profits reported		14,482		80,390		56,784
Assessed value		1,105		108,167		109,971
Actual value reported		2,050		214,214		211,833
Franchise assessment		32,500		56,000		57,000
Franchise tax		390		672		684
Total tax reported		416		14,927		5,813
License tax (levied since 1915)		45		405		550
Showing gross receipts from $50,000 to $150,000	1	$129,476	5	$461,185	19	$1,484,913
Net profits reported		-----		81,725		51,461
Assessed value		5,960		115,622		317,404
Actual value reported		624		190,895		588,853
Franchise assessment		2,250		49,500		62,000
Franchise tax		27		594		744
Total tax reported		451		3,824		8,954
License tax (levied since 1915)		25		160		420
Showing gross receipts from $150,000 to $500,000	3	$702,174	0	-----	4	$1,092,437
Net profits reported		61,417		-----		28,701
Assessed value		38,905		-----		436,295
Actual value reported		14,318		-----		630,509
Franchise assessment		22,000		-----		52,500
Franchise tax		264		-----		630
Total tax reported		1,962		-----		14,382
License tax (levied since 1915)		55		-----		155
Showing gross receipts exceeding $500,000	4	$6,706,304	0	-----	1	$6,070,176
Net profits reported		-----		-----		12,138
Assessed value		37,655		-----		11,568
Actual value reported		48,546		-----		43,480
Franchise assessment		28,250		-----		10,000
Franchise tax		339		-----		120
Total tax reported		11,167		-----		3,800
License tax (levied since 1915)		50		-----		75
Inoperative corporations	3	-----	6	-----	10	-----
Assessed value		-----		-----		$150
Actual value reported		-----		-----		6,770
Franchise assessment		$2,750		$4,250		7,000
Franchise tax		33		51		84
Total tax reported		15		-----		10
License tax (levied since 1915)		95		80		155
Total franchise assessment	15	$88,750	55	$136,750	95	$226,500
Total franchise tax		1,065		1,641		2,718
Gross receipts of corporations reporting no profits	8	$7,045,561	5	$47,992	26	$1,265,901

12—Continued.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 229	No. of corporations	Corporation Class 230	No. of corporations	Corporation Class 231	No. of corporations	Corporation Class 232	No. of corporations	Corporation Class 233	No. of corporations	Corporation Class 234
115	$9,503,169	15	$471,300	14	$453,574	113	$5,962,492	161	$5,366,388	90	$8,064,721
115	$4,870,287	15	$138,413	14	$328,288	113	$3,687,638	161	$2,588,114	90	$4,135,859
57	$149,000	4	$4,857	3	$6,542	45	$132,975	33	$140,815	44	$121,427
	47,958		581		317		6,730		17,707		31,293
	373,375		9,900		1,400		64,897		434,755		502,471
	369,898		3,200		4,300		75,217		598,310		485,664
	71,750		4,000		3,000		44,250		55,250		59,250
	861		48		36		531		663		711
	12,988		82		85		5,412		13,415		14,180
	1,525		60		30		1,025		880		1,290
5	$68,344	2	$31,785	3	$43,334	12	$180,441	7	$104,975	8	$132,285
	34,932		9,794		6,894		17,083		24,475		9,434
	89,250		16,302		1,072		24,191		133,340		316,076
	7,700		48,085		2,500		42,682		55,248		341,734
	11,500		7,500		4,500		20,250		20,250		35,250
	138		90		54		243		243		423
	2,521		489		48		420		4,920		10,330
	85		125		50		225		300		2,320
15	$489,037	2	$65,799	3	$104,479	9	$293,315	14	$487,505	7	$234,429
	53,724		20,777		14,490		44,706		49,683		63,153
	416,372		4,000		4,605		20,743		370,960		92,180
	488,516		----------		41,044		153,420		175,138		3,059
	55,500		10,500		7,500		41,250		47,500		28,500
	666		126		90		495		570		342
	15,514		358		306		486		13,701		11,886
	655		125		50		205		335		145
19	$1,631,846	3	$168,361	2	$168,335	8	$728,622	22	$1,863,700	4	$292,144
	199,062		29,188		278		49,949		122,709		208,680
	874,157		21,037		11,210		43,570		1,424,637		58,984
	2,580,232		51,590		19,825		17,728		515,300		290,456
	235,000		23,000		4,500		23,500		150,750		59,750
	2,820		276		54		282		1,809		717
	38,664		985		97		1,969		20,305		13,965
	940		160		70		245		650		130
6	$1,625,928	1	$479,485	1	$314,199	3	$776,388	4	$703,489	0	----------
	49,906		21,080		----------		115,391		8,732		----------
	564,008		1,180		3,550		955,541		7,650		----------
	767,675		700		15,000		1,523,110		1,000		----------
	109,500		4,500		7,000		112,000		15,000		----------
	1,314		54		84		1,344		180		----------
	17,769		1,215		114		24,034		1,118		----------
	290		50		15		125		85		----------
2	$1,448,962	1	$579,750	0	----------	4	$7,898,401	1	$630,816	1	$2,230,056
	27,097		11,173		----------		148,550		----------		----------
	82,945		----------		----------		232,433		113,666		----------
	164,872		----------		----------		361,829		184,702		----------
	20,000		3,500		----------		87,000		30,000		2,500
	240		42		----------		1,044		360		30
	2,556		1,784		----------		7,497		4,159		402
	45		10		----------		195		25		100
11	----------	2	----------	2	----------	32	----------	80	----------	26	----------
	$27,050		----------		----------		$25,425		$119,845		$32,185
	78,000		$2,370		----------		31,640		201,240		10,600
	9,000		1,750		$1,750		29,000		64,000		24,750
	108		21		21		348		768		297
	20		----------		----------		3,989		204		342
	205		20		35		1,055		1,600		710
115	$512,250	15	$54,750	14	$28,250	113	$357,250	161	$382,750	90	$210,000
	6,147		657		339		4,287		4,593		2,520
26	$782,332	3	$56,202	7	$513,694	41	$1,222,307	33	$1,907,709	29	$2,382,831

SCHEDULE

Classified Abstract of Reports Made by General Corporations

Abstract of 1915 reports	No. of corporations	Corporation Class 235
Total amount paid in for stock	161	$18,453,641
Total debt	161	$8,242,950
Showing gross receipts not exceeding $10,000	32	$59,245
Net profits reported		11,351
Assessed value		423,555
Actual value reported		493,371
Franchise assessment		40,750
Franchise tax		489
Total tax reported		12,533
License tax (levied since 1915)		990
Showing gross receipts from $10,000 to $20,000	3	$42,671
Net profits reported		9,071
Assessed value		51,170
Actual value reported		----------
Franchise assessment		4,250
Franchise tax		51
Total tax reported		1,648
License tax (levied since 1915)		85
Showing gross receipts from $20,000 to $50,000	8	$233,745
Net profits reported		40,864
Assessed value		239,319
Actual value reported		5,000
Franchise assessment		35,500
Franchise tax		426
Total tax reported		10,208
License tax (levied since 1915)		230
Showing gross receipts from $50,000 to $150,000	6	$446,529
Net profits reported		103,689
Assessed value		457,962
Actual value reported		393,642
Franchise assessment		24,250
Franchise tax		291
Total tax reported		15,454
License tax (levied since 1915)		1,035
Showing gross receipts from $150,000 to $500,000	0	----------
Net profits reported		----------
Assessed value		----------
Actual value reported		----------
Franchise assessment		----------
Franchise tax		----------
Total tax reported		----------
License tax (levied since 1915)		----------
Showing gross receipts exceeding $500,000	0	----------
Net profits reported		----------
Assessed value		----------
Actual value reported		----------
Franchise assessment		----------
Franchise tax		----------
Total tax reported		----------
License tax (levied since 1915)		----------
Inoperative corporations	112	----------
Assessed value		$58,285
Actual value reported		171,800
Franchise assessment		94,750
Franchise tax		1,137
Total tax reported		1,945
License tax (levied since 1915)		2,560
Total franchise assessment	161	$199,500
Total franchise tax		2,394
Gross receipts of corporations reporting no profits	27	$443,993

12—Concluded.

to State Board of Equalization for Franchise Tax Assessment.

No. of corporations	Corporation Class 236	No. of corporations	Corporation Class 237	No. of corporations	Corporation Class 238	No. of corporations	Grand Total
976	$162,197,267	799	$319,189,479	1,049	$244,091,205	----------	$3,698,566,991
976	$97,757,775	799	$80,390,084	1,049	$47,569,867	----------	$1,515,638,090
470	$1,135,567	233	$610,274	302	$609,274	5,615	$17,453,989
	150,322		111,227		58,528		2,811,565
	2,130,775		1,829,562		1,081,700		74,001,602
	5,023,910		2,408,717		1,352,749		117,812,572
	722,750		421,500		491,250		9,128,250
	8,673		5,058		5,895		109,539
	52,779		37,407		31,329		2,042,239
	11,945		14,740		23,490		186,070
72	$994,259	64	$1,064,235	32	$479,617	1,680	$24,567,068
	131,740		116,876		10,344		2,965,322
	1,624,937		1,270,676		513,009		39,247,243
	2,636,672		1,881,889		276,939		65,865,791
	247,750		330,000		82,000		4,801,000
	2,973		3,960		984		57,612
	51,848		34,602		24,270		1,156,980
	3,725		6,155		2,250		63,165
63	$1,899,002	76	$2,262,779	34	$1,105,797	2,396	$79,484,425
	312,518		546,292		20,965		8,440,210
	3,445,119		1,867,153		430,635		83,516,288
	3,986,678		2,609,550		962,844		115,421,948
	867,000		583,500		111,250		10,653,250
	10,404		7,002		1,335		127,839
	83,633		42,083		15,746		2,441,133
	4,740		6,490		4,295		92,710
26	$2,016,703	57	$5,545,115	38	$3,382,496	2,285	$197,824,245
	268,745		1,416,937		238,307		16,654,556
	3,489,737		4,174,281		1,440,983		115,550,284
	2,856,518		9,248,458		2,143,661		171,525,001
	453,750		1,421,500		340,500		17,808,000
	5,445		17,058		4,086		213,696
	88,198		126,067		53,873		3,751,230
	3,245		7,210		5,300		92,245
8	$2,053,979	35	$8,998,220	29	$7,967,949	1,268	$332,990,963
	379,126		2,467,340		1,208,936		22,810,942
	3,106,329		5,293,228		1,927,072		103,962,882
	3,898.314		7,635,145		2,412,953		152,496,883
	879,500		2,389,250		553,000		22,309,500
	10,554		28,671		6,636		267,714
	122,496		179,276		72,149		3,759,425
	1,535		5,425		4,335		72,145
3	$5,449.979	17	$100,698,903	15	$32,694,071	772	$2,704,409,882
	684,633		21,518,283		8,155,081		193,030,253
	25,928,947		60,027,805		5,563,510		245,398,751
	---------------		79,524,690		1,710,801		314,956,746
	4,977,500		28,243,500		2,310,000		81,668,750
	59,730		338,922		27,720		980,025
	673,179		1,736,958		688,003		16,610,739
	2,075		6,795		5,125		126,785
334	---------------	317	---------------	599	---------------	3,992	---------------
	$546,087		$845,437		$1,544,931		$21,116,148
	1,189,713		886,672		2,169,620		27,920,172
	406,500		406,500		815,750		5,853,500
	4,878		4,878		9,789		70,242
	4,341		12,291		30,118		258,251
	12,430		20,845		42,310		190,680
976	$8,554,750	799	$33,795,750	1,049	$4,703,750		$152,222,250
	102,657		405,549		56,445		1,826,667
351	$5,319,399	211	$8,870,756	293	$12,574,690	5,779	$558,253,604

SCHEDULE 13.

Summary of Appraisals Made for Tax Commission and 1915 Assessments.

County	Total appraisals	Total assessed values	Total appraisals, inside land	Assessments, inside land	Total appraisals, inside improvements	Assessments, inside improvements	Total appraisals, outside land and improvements	Assessments, outside land and improvements
Alameda	$26,540,835	$13,460,150	$16,425,935	$8,588,250	$9,474,250	$4,599,950	$640,650	$271,950
Butte	2,118,550	773,385	341,100	98,275	510,650	247,650	1,266,860	427,460
Colusa	2,054,510	837,760	33,500	18,000	77,500	36,560	1,943,510	837,760
Contra Costa	2,670,350	1,062,825	1,175,020	392,410	468,550	234,450	1,026,780	435,965
Fresno	4,733,150	2,116,915	1,678,425	774,790	1,237,550	640,050	1,817,175	702,075
Glenn	1,503,666	933,924	100,700	75,850	216,950	144,700	1,186,016	713,374
Humboldt	1,956,709	554,665	627,030	200,230	455,600	192,185	874,079	162,250
Imperial	779,065	294,782	151,375	56,780	137,550	58,117	490,140	179,885
Kern	1,337,712	460,400	451,765	112,960	596,087	256,450	289,860	90,990
Los Angeles	32,386,454	14,038,675	21,617,592	8,926,785	7,285,700	3,426,730	3,483,162	1,685,160
Madera	1,330,431	568,640	257,400	97,355	188,750	96,925	884,281	374.360
Marin	2,758,030	1,146,910	812,580	358,545	727,600	347,650	1,218.450	440,715
Mendocino	718,715	268,940	126,800	59,680	84,500	47,350	507,415	161,910
Napa	2,374,060	1,022,150	359,870	156,400	474,650	293,100	1,539,540	572,650
Nevada	343,885	206,085	53,750	30,100	177,550	124,050	112,585	51,935
Orange	3.688,265	1,103,965	1,048.425	248,985	509,700	237,435	2,130,149	551,270
Placer	774,765	236,360	97,400	27,105	146,100	71,350	531,265	137,935
Riverside	870,900	247,967	380,435	92,320	242,185	83,130	248,280	72,517
Sacramento	16,802,960	9,628,370	9,134,800	5,669,400	6,210,600	3,349,950	1,457,560	609,020
San Bernardino	3,483,737	1,148,265	1,504,637	488,795	872,288	302,900	1,070,812	356.570
San Diego	5,867,050	2,114,834	2,974,300	1,405,930	1,425,600	358,420	1,467,150	350,484
San Francisco	81,896,200	39,421,190	45,349,050	22,322,090	36,547,150	17,099,100		
San Joaquin	5,016,526	2,161,155	1,826,100	754,825	1,269,800	654,000	1,920,626	752,330
San Luis Obispo	1,174,586	362,380	179,766	56 635	337,900	155,225	656,920	150,520
San Mateo	4,167,500	1,445,200	1,088,100	444,675	576,000	183,300	2,103,430	817,225
Santa Barbara	1,136,420	465,350	368,155	146,450	476,550	205,100	291,715	113,800
Santa Clara	4,267,350	2,137,065	1,041,900	616,475	1,014,050	655,120	2,211,400	865,470
Santa Cruz	2,299,035	938,565	717,240	350,890	617,200	261,320	937,845	317,420
Siskiyou	767,760	323,715	49,900	18,750	176,100	89,700	541,760	215,265
Solano	1,565,865	933,190	209,050	89,750	346,100	225,900	1,012,715	617,540
Sonoma	2,981,116	1,110,410	576,256	249,670	448,350	264,680	1,956.510	596,060
Stanislaus	1,784,500	822,030	260,660	106,660	489,600	236,930	1,034,240	478.440
Sutter	194,265	112,330	7,200	3,500	33,500	20,550	153,565	88,280
Tehama	774,599	418,055	65,605	33,875	157,750	110,850	551,244	273,330
Tulare	4,128,153	1,425,220	671,885	215,405	672,142	335,450	2,784,125	874,365
Ventura	1,739,862	701,190	239,400	92,740	258,750	93,850	1,241,712	514,600
Yolo	2,064,405	1,047,425	121,350	53,415	265,850	171,000	1,677,205	823,010
Yuba	1,234,752	494.845	181,610	68,555	455,040	163,275	598.102	262,225
Totals	$232,286,693	$106,545,282	$112,304,066	$53,503,305	$75,661,142	$36,074,392	$43,858,734	$16,946,115

SCHEDULE 14.

Summary of Appraisals and Assessments, 1915.

County	Total appraisals, inside business land	Assessments inside business land	Total appraisals, inside business improvements	Assessments, inside business improvements	Total appraisals, inside business property	Assessments, inside business property
Alameda	$12,837,360	$6,873,085	$6,751,500	$3,164,400	$19,588,860	$10,037,485
Alpine	------	------	------	------	------	------
Amador	------	------	------	------	------	------
Butte	287,750	82,575	406,750	205,550	694,500	288,125
Calaveras	------	------	------	------	------	------
Colusa	33,500	18,000	77,500	36,500	111,000	54,500
Contra Costa	311,070	77,390	392,050	195,100	703,120	272,490
Del Norte	------	------	------	------	------	------
El Dorado	------	------	------	------	------	------
Fresno	1,494,400	686,690	1,022,000	530,100	2,516,400	1,216,790
Glenn	85,200	61,550	190,300	130,600	275,500	192,150
Humboldt	501,130	155,960	317,000	135,920	818,130	291,880
Imperial	135,000	49,710	109,500	45,817	244,500	95,527
Inyo	------	------	------	------	------	------
Kern	382,725	100,240	521,287	223,050	904,012	323,290
Kings	------	------	------	------	------	------
Lake	------	------	------	------	------	------
Lassen	------	------	------	------	------	------
Los Angeles	19,953,624	8,253,635	6,786,950	3,168,110	26,740,574	11,421,745
Madera	246,150	93,805	166,500	85,300	412,650	179,105
Marin	544,680	226,945	426,700	199,950	971,380	426,895
Mariposa	------	------	------	------	------	------
Mendocino	111,500	53,700	72,500	39,200	184,000	92,900
Merced	------	------	------	------	------	------
Modoc	------	------	------	------	------	------
Mono	------	------	------	------	------	------
Monterey	------	------	------	------	------	------
Napa	305,320	135,350	378,500	238,750	683,820	374,100
Nevada	43,000	25,600	148,000	100,600	191,000	126,200
Orange	629,575	139,690	404,100	188,710	1,033,675	328,400
Placer	19,400	8,330	39,900	19,750	59,300	28,080
Plumas	------	------	------	------	------	------
Riverside	321,410	73,885	147,100	46,500	468,510	120,385
Sacramento	9,050,200	5,624,700	6,086,250	3,281,550	15,136,450	8,906,250
San Benito	------	------	------	------	------	------
San Bernardino	1,047,577	328,920	654,888	238,150	1,702,465	567,070
San Diego	2,597,000	1,268,800	1,199,000	306,460	3,796,000	1,575,260
San Francisco	42,455,900	20,930,820	35,090,700	16,473,400	77,546,600	37,404,220
San Joaquin	1,716,250	716,985	1,151,050	570,100	2,867,300	1,287,085
San Luis Obispo	161,516	51,085	266,700	126,825	428,216	177,910
San Mateo	422,225	85,925	410,000	128,000	832,225	213,925
Santa Barbara	314,050	124,020	396,400	153,050	710,450	277,070
Santa Clara	896,550	528,485	836,550	519,350	1,733,100	1,047,835
Santa Cruz	599,565	298,795	524,000	298,800	1,123,565	597,595
Shasta	------	------	------	------	------	------
Sierra	------	------	------	------	------	------
Siskiyou	43,250	16,200	158,250	79,900	201,500	96,100
Solano	38,850	25,700	108,150	74,350	147,000	100,050
Sonoma	500,512	219,930	348,000	194,660	848,512	414,590
Stanislaus	229,750	92,775	445,000	214,480	674,750	307,255
Sutter	4,300	2,500	25,250	16,100	29,550	18,600
Tehama	50,750	26,250	133,450	95,300	184,200	121,550
Trinity	------	------	------	------	------	------
Tulare	577,218	190,470	538,142	276,350	1,115,360	466,820
Tuolumne	------	------	------	------	------	------
Ventura	186,450	69,190	152,500	54,510	338,950	123,700
Yolo	96,150	39,460	184,450	126,150	280,600	165,610
Yuba	171,560	63,555	434,340	156,275	605,900	219,830
Totals	$99,402,417	$47,820,705	$67,501,207	$32,137,667	$166,903,624	$79,958,372

SCHEDULE 15.

Summary—Appraisals and Assessments.

County	Total appraised value, inside residence land	Assessments, inside residence land	Total appraised value, inside residence improvements	Assessments, inside residence improvements	Total appraised value, inside residence property	Assessment, inside residence property	Total appraised value, inside acreage	Assessment, inside acreage
Alameda	$2,211,500	$1,122,165	$1,314,650	$668,300	$3,526,150	$1,790,465	$145,400	$60,400
Alpine								
Amador								
Butte	47,600	13,975	47,150	25,100	94,750	39,075		
Calaveras								
Colusa								
Contra Costa	49,250	12,440	73,600	38,350	122,850	50,790	817,600	303,580
Del Norte								
El Dorado								
Fresno	65,325	34,385	68,550	41,400	133,875	75,785		
Glenn	15,500	14,300	26,650	14,100	42,150	28,400		
Humboldt	125,900	44,270	138,600	57,265	264,500	101,535		
Imperial	16,375	7,070	28,050	12,300	44,425	19,370		
Inyo								
Kern	65,225	11,230	62,400	27,750	127,625	38,980		
Kings								
Lake								
Lassen								
Los Angeles	745,850	286,250	320,700	171,400	1,066,550	457,650	124,900	58,890
Madera	11,250	3,550	22,250	11,625	33,500	15,175		
Marin	113,700	55,025	97,350	46,600	211,050	101,625		
Mariposa								
Mendocino	15,300	5,980	12,000	8,150	27,300	14,130		
Merced								
Modoc								
Mono								
Monterey								
Napa	54,550	21,050	96,150	54,350	150,700	75,400		
Nevada	10,750	4,500	29,550	23,450	40,300	27,950		
Orange	64,050	20,325	57,950	26,750	122,000	47,075	376,500	97,310
Placer	55,800	12,290	51,200	30,100	107,000	42,390		
Plumas								
Riverside	25,590	6,700	44,900	17,300	70,490	24,000		
Sacramento	84,600	44,700	124,350	68,400	208,950	113,100		

San Benito								
San Bernardino	71,110	21,310	110,200	34,020	181,310	55,330	258,000	95,695
San Diego	377,300	137,130	226,600	51,960	603,900	188,090		
San Francisco	839,150	438,310	1,453,950	624,100	2,293,100	1,062,410	2,056,500	954,560
San Joaquin	109,850	37,840	118,750	83,900	228,600	121,740		
San Luis Obispo	18,250	5,550	71,200	28,400	89,450	33,950		
San Mateo	54,725	14,700	82,500	30,600	137,225	45,300	694,650	368,750
Santa Barbara	49,505	20,630	78,050	51,050	127,555	71,680	6,700	2,800
Santa Clara	117,050	79,695	149,500	118,120	266,550	197,815		
Santa Cruz	100,225	45,235	85,900	36,370	186,125	81,605		
Shasta								
Sierra								
Siskiyou	6,650	2,550	17,850	9,800	24,500	12,350		
Solano	10,925	5,550	43,600	26,200	54,525	31,750		
Sonoma	44,270	18,140	73,650	49,120	117,920	67,260		
Stanislaus	30,910	13,885	41,600	22,450	75,510	36,335		
Sutter	2,900	1,000	8,250	4,450	11,150	5,450		
Tehama	14,855	7,625	24,300	15,550	39,155	23,175		
Trinity						84,035		
Tulare	94,668	24,935	134,000	59,100	228,668			
Tuolumne								
Ventura	30,150	14,390	64,650	22,110	94,800	36,500		
Yolo	6,800	4,025	15,450	10,250	22,250	14,275		
Yuba	10,050	5,620	20,700	7,170	30,750	12,690		
Totals	$5,767,458	$2,618,325	$5,439,750	$2,627,410	$11,207,208	$5,244,635	$4,480,250	$1,941,985

SCHEDULE 16.

Summary of Appraisals Made for Tax Commission and 1916 Assessments.

County	Total appraisals, land and improvements	Assessments land and improvements	Appraised inside land	Assessed inside land	Appraised inside improvements	Assessed inside improvements
Alameda	$26,166,835	$13,025,525	$16,301,935	$8,403,025	$9,224,250	$4,348,450
Butte	2,118,550	792,341	341,100	98,275	510,650	247,650
Colusa	2,054,510	837,760	33,500	18,000	77,500	36,500
Contra Costa	2,670,350	1,048,595	1,175,020	389,525	468,550	220,045
Fresno	4,733,150	2,121,180	1,678,425	774,090	1,237,550	641,900
Glenn	1,563,666	1,002,352	100,700	69,663	216,950	146,750
Humboldt	1,956,709	554,965	627,030	199,730	455,600	192,685
Imperial	779,065	296,702	151,375	63,050	137,550	58,002
Kern	1,335,312	457,780	464,615	114,385	632,137	270,245
Los Angeles	32,320,054	15,240,395	21,617,592	9,880,035	7,285,700	3,574,755
Madera	1,330,431	575,790	257,400	101,655	188,750	97,225
Marin	2,688,030	1,161,350	742,580	366,215	727,000	340,000
Mendocino	762,215	267,490	126,800	59,680	84,500	47,400
Napa	2,371,060	1,097,920	358,870	167,450	472,650	289,550
Nevada	343,885	207,585	53,750	30,100	177,550	123,650
Orange	3,687,265	1,095,365	1,048,425	272,680	508,700	241,275
Placer	766,265	218,745	94,400	26,170	140,600	67,600
Riverside	870,900	248,520	395,510	97,510	250,135	86,930
Sacramento	16,802,960	9,476,660	9,134,800	5,494,100	6,210,600	3,278,250
San Bernardino	3,483,737	1,148,415	1,540,637	493,575	872,288	297,530
San Diego	5,867,050	2,127,449	2,974,300	1,403,920	1,425,600	358,380
San Francisco	79,839,700	38,293,640	43,295,050	21,248,040	36,544,650	17,045,600
San Joaquin	5,016,526	2,214,575	1,826,100	733,070	1,269,800	727,450
San Luis Obispo	1,174,586	362,380	179,766	56,635	337,900	155,225
San Mateo	4,167,500	1,447,100	1,009,100	443,825	576,000	183,050
Santa Barbara	1,136,420	468,200	368,155	145,000	476,550	202,450
Santa Clara	4,227,050	2,127,965	1,012,150	594,705	1,012,000	663,585
Santa Cruz	2,247,685	912,840	717,240	346,805	617,200	256,665
Siskiyou	755,760	312,415	79,900	20,200	176,100	86,600
Solano	1,565,865	938,710	207,050	90,500	346,100	228,750
Sonoma	2,946,491	1,088,670	576,256	249,370	448,350	265,080
Stanislaus	1,784,500	820,770	260.660	106,660	489,600	234,090
Sutter	194,265	112,845	7,200	3,550	33,500	20,950
Tehama	774,599	415,730	65,605	35,235	157,750	111,800
Tulare	4,128,153	1,427.215	671,886	215,775	672,142	316,050
Ventura	1,739,862	689,020	239,400	98,490	258,750	75,000
Yolo	2,064,405	1,047,425	121,350	53,415	265,850	171,000
Yuba	1,234,752	498,460	181,610	69,535	455,040	167,135
Totals	$229,550,118	$106,180,844	$110,116,242	$53,033,643	$75,442,092	$35,875,252

SCHEDULE 17.

County	Appraisals, outside acreage	Assessed, outside acreage	Total ap- business, land praisals, inside	Assessments, inside business, land	Total appraisals, business improvements	Assessments, business improvements	Total appraisals, inside business	Total assessments, inside business
Alameda	$640,650	$274,050	$13,706,535	$7,088,825	$7,836,000	$3,637,850	$21,542,535	$10,726,675
Butte	1,266,800	446,416	287,750	82,575	406,750	205,550	694,500	288,125
Colusa	1,943,510	783,260	33,500	18,000	77,500	36,500	111,000	54,500
Contra Costa	1,026,780	439,025	311,070	105,595	392,050	183,990	703,120	289,585
Fresno	1,817,175	705,190	1,494,400	685,670	1,022,000	529,900	2,516,400	1,215,570
Glenn	1,186,016	785,939	85,200	57,200	190,300	130,450	275,500	187,650
Humboldt	874,079	162,550	501,130	155,460	317,000	135,420	818,130	290,880
Imperial	490,140	175,650	135,000	55,970	109,500	45,577	244,500	101,547
Kern	238,560	73,150	382,725	100,010	521,287	221,650	904,012	321,660
Los Angeles	3,416,762	1,785,605	19,953,624	9,050,950	6,786,950	3,305,220	26,740,574	12,356,170
Madera	884,281	376,910	246,150	97,755	166,500	85,400	412,650	183,155
Marin	1,218,450	455,135	544,680	229,415	426,700	189,300	971,380	418,715
Mendocino	490,915	160,410	111,500	53,700	72,500	39,200	184,000	92,900
Napa	1,539,540	640,920	304,320	144,950	376,500	233,250	680,820	378,200
Nevada	112,585	53.835	43,000	25,600	148,000	100,600	191,000	126,200
Orange	2,130,140	581,410	629,575	162,275	404,100	193,460	1,033,675	355,735
Placer	531,265	124,975	18,900	7,910	39,900	18,750	58,800	26,660
Riverside	225,255	64,080	321,410	73,220	147,100	46,900	468,510	120,120
Sacramento	1,457,560	704,310	9,050,200	5,447,400	6,086,250	3.211,500	15,136,450	8,658,900
San Bernardino	1,070,812	357,310	1,047,577	330,430	484,088	229,500	1,531,665	559,930
San Diego	1,467,150	365,149	2,597,000	1,268,800	1,199,000	306,460	3,796,000	1,575,260
San Francisco	-----	-----	42,455,900	26,822,280	35,090,700	16.420,500	77,546,600	37,242,780
San Joaquin	1,920,626	754,055	1,716,250	696,855	1,151,050	640,700	2,867,300	1,337,555
San Luis Obispo	656,920	150,520	161,516	51,085	266,700	126,825	428,216	177,910
San Mateo	2,503,400	820,225	422,225	85,175	410,000	127,050	832,225	212,225
Santa Barbara	291,715	120,750	314,050	122,520	396,400	152,000	710,450	274,520
Santa Clara	2,202,900	869,675	866,800	510,445	834,500	533,200	1,701,300	1,043,645
Santa Cruz	913,245	309,370	599,565	294,700	524,000	218,210	1,123,565	512,910
Siskiyou	499,760	205,615	43,250	17,650	158,250	77,100	201,500	94,750
Solano	1,012,715	619,460	38,850	25,950	108,150	74,700	147,000	100,650
Sonoma	1,921,885	574,220	500,512	219,630	248,000	195,560	848,512	415,190
Stanislaus	1,034,240	480,020	229,750	92,775	445,000	211,640	674,750	304,415
Sutter	153,565	88,345	4,300	2,500	25,250	16,100	29,550	18,600
Tehama	551,244	268,695	50,750	27,960	133,450	97,100	184,200	125,060
Tulare	2,784,125	895,390	577,218	190,470	538,142	260,230	1,115,360	450,700
Ventura	1,241,712	515,530	186,450	74,940	152,500	27,510	338,950	102,450
Yolo	1,677,205	823,010	96,150	39,460	184,450	126,150	280,600	165,610
Yuba	598,102	261,790	171,560	63,915	434,340	159,965	605,900	223,880
Totals	$43,991,784	$17,271,949						

SCHEDULE 18.

Summary of Appraisals and 1916 County Assessments.

County	Total appraisals, residence land	Total assessments, residence land	Total appraisals, residence improvements	Total assessments, residence improvements	Total appraisals, residence	Total assessments, residence
Alameda	$2,147,500	$1,079,850	$1,164,650	$592,200	$3,312,150	$1,672,050
Butte	47,600	13,975	47,150	25,100	94,750	39,075
Contra Costa	49,250	17,200	73,600	35,455	122,850	52,655
Fresno	65,325	34,395	68,550	40,450	133,875	74,845
Glenn	15,500	12,463	26,650	16,300	42,150	28,763
Humboldt	125,900	44,270	138,600	57,265	264,500	101,535
Imperial	16,375	7,080	28,050	12,425	44,425	19,505
Kern	65,225	11,230	62,400	27,595	127,625	38,825
Los Angeles	745,850	383,150	320,700	168,575	1,066,550	551,725
Madera	11,250	3,900	22,250	11,825	33,500	15,725
Marin	113,700	59,925	97,350	46,400	211,050	106,325
Mendocino	15,300	5,980	12,000	8,200	27,300	14,180
Napa	54,550	22,500	96,150	56,300	150,700	78,800
Nevada	10,750	4,500	29,550	23,050	40,300	27,550
Orange	64,050	21,580	56,950	26,840	121,000	48,420
Placer	53,300	11,775	45,700	27,350	99,000	39,125
Riverside	25,590	6,790	44,900	17,300	70,490	24,090
Sacramento	84,600	46,700	124,350	66,750	208,950	113,450
San Bernardino	71,110	21,100	110,200	33,785	181,310	54,885
San Diego	377,300	135,120	226,600	51,920	603,900	187,040
San Francisco	839,150	425,760	1,453,950	625,100	2,293,100	1,050,860
San Joaquin	109,850	36,215	118,750	86,750	228,600	122,965
San Luis Obispo	18,250	5,550	71,200	28,400	89,450	33,950
San Mateo	54,725	14,600	82,500	30,300	137,225	44,900
Santa Barbara	49,505	20,480	78,050	49,600	127,555	70,080
Santa Clara	117,050	75,445	149,500	112,285	266,550	187,730
Santa Cruz	100,225	45,250	85,900	34,665	186,125	79,915
Siskiyou	6,650	4,250	17,850	9,500	24,500	13,750
Solano	10,925	5,550	43,600	26,200	54,525	31,750
Sonoma	44,270	18,140	73,650	49,120	114,920	67,260
Stanislaus	30,910	13,885	44,600	22,450	75,510	36,335
Sutter	2,900	1,050	8,250	4,850	11,150	5,900
Tehama	14,855	7,275	24,300	14,700	39,155	21,975
Tulare	94,668	25,305	134,000	55,820	228,668	81,125
Ventura	30,150	14,390	64,650	30,410	94,800	44,800
Yolo	6,800	4,025	15,450	10,250	22,250	14,275
Yuba	10,050	5,620	20,700	7,170	30,750	12,790

SCHEDULE 19.

Summary of Total Actual Values in Counties Based on 1915 Assessments.

County	Outside land and improvements	Inside land	Inside improvements	Personal property	Money and credits	Total non-operative value. 1915
Alameda	$53,453,228	$244,043,115	$124,439,209	$41,082,326	$3,842,192	$466,860,070
Alpine	1,561,075	------------	------------	201,811	------------	1,762,886
Amador	11,774,868	735,745	1,197,662	1,826,782	1,320	15,536,377
Butte	38,663,648	4,612,856	4,734,591	9,392,293	178,320	57,581,708
Calaveras	15,491,165	325,396	762,104	2,228,964	37,396	18,845,025
Colusa	28,177,624	558,513	1,000,138	4,002,317	35,906	33,774,498
Contra Costa	51,121,246	34,231,629	13,739,812	20,931,733	1,753,191	121,777,611
Del Norte	12,248,216	249,388	290,100	773,822	------------	13,561,526
El Dorado	12,153,094	428,092	911,697	2,288,862	5,744	15,787,489
Fresno	126,410,029	29,167,933	17,637,212	29,940,857	791,211	203,947,242
Glenn	20,251,855	1,194,826	1,024,139	4,437,941	14,957	26,923,718
Humboldt	117,568,338	13,614,740	6,283,556	7,127,888	214,261	144,808,783
Imperial	42,457,365	8,877,826	4,465,894	10,476,059	------------	66,277,144
Inyo	15,811,947	799,986	619,809	2,997,385	24,698	20,253,825
Kern	160,735,640	16,531,814	8,732,857	48,040,629	17,908	234,058,848
Kings	27,572,150	1,907,637	2,304,505	7,520,098	55,786	39,360,176
Lake	10,386,279	644,660	435,231	1,672,974	77,831	13,216,975
Lassen	14,685,241	195,691	726,262	4,590,891	68,674	20,266,759
Los Angeles	278,325,300	781,551,213	335,664,724	182,106,245	26,340,762	1,603,988,244
Madera	26,517,113	1,288,278	833,492	3,586,241	6,520	32,231,644
Marin	26,324,246	13,049,530	9,547,345	3,659,675	8,259	52,589,055
Mariposa	7,371,852	------------	------------	1,522,451	3,433	8,897,736
Mendocino	36,210,577	2,109,102	1,999,678	5,371,878	112,052	45,803,287
Merced	47,707,468	1,708,035	2,047,046	9,161,221	------------	60,623,770
Modoc	15,191,759	242,889	459,385	4,527,268	276,912	20,698,213
Mono	2,194,244	------------	------------	866,205	4,225	3,064,674
Monterey	53,371,597	7,998,228	5,227,735	11,762,204	6,417	78,366,181
Napa	23,772,623	4,930,982	4,465,546	6,139,548	124,015	39,432,714
Nevada	8,733,800	794,160	1,744,464	2,176,336	35,166	13,483,926
Orange	99,080,857	35,244,315	10,395,423	21,909,693	168,135	166,798,423
Placer	30,299,272	3,535,741	2,947,180	3,085,824	43,080	39,911,097
Plumas	15,869,603	------------	------------	2,725,356	61,303	18,656,262
Riverside	45,466,634	28,098,306	16,033,344	5,707,284	------------	95,305,568
Sacramento	54,430,687	57,585,147	32,710,320	20,232,687	806,015	165,764,856
San Benito	15,812,218	1,207,646	1,417,519	3,566,105	------------	22,003,488
San Bernardino	64,357,608	32,857,482	23,011,577	6,618,312	43,860	126,888,929
San Diego	44,006,350	91,165,588	38,812,596	15,142,634	519,504	189,646,672
San Francisco	------------	618,195,422	368,756,309	107,961,327	37,446,431	1,132,359,489
San Joaquin	77,147,067	25,473,276	20,130,935	17,350,816	434,082	140,536,176
San Luis Obispo	46,529,120	3,190,563	3,930,517	12,734,661	13,615	66,398,476
San Mateo	51,054,990	19,309,675	11,720,947	4,776,677	813,652	87,675,941
Santa Barbara	38,757,626	10,649,639	11,546,563	10,558,926	21,508	71,534,262
Santa Clara	97,433,335	31,201,536	21,409,471	15,825,284	1,620,467	167,490,093
Santa Cruz	23,422,499	10,983,535	7,777,805	5,090,515	27,341	47,301,695
Shasta	26,247,845	1,123,938	1,902,098	3,588,765	------------	32,862,646
Sierra	4,976,830	260,410	314,929	601,151	3,987	6,157,307
Siskiyou	31,702,597	1,288,223	2,212,580	6,974,327	276,594	42,454,321
Solano	24,383,874	5,134,276	5,325,195	6,328,790	48,678	41,220,813
Sonoma	74,345,626	9,741,760	8,640,613	12,139,595	369,439	105,237,033
Stanislaus	42,670,179	5,610,449	5,581,418	10,099,342	286,452	64,247,840
Sutter	17,010,489	411,172	409,345	2,774,491	121,748	20,727,245
Tehama	19,478,097	1,264,564	1,733,758	5,631,171	258,876	28,366,466
Trinity	7,409,679	------------	------------	1,160,270	18,223	8,588,172
Tulare	105,890,208	9,176,362	6,356,853	12,197,050	109,364	133,729,837
Tuolumne	17,025,567	600,875	1,230,704	2,320,225	10,302	21,187,673
Ventura	51,785,784	5,773,142	4,300,827	7,703,891	26,174	69,589,818
Yolo	33,848,145	1,884,056	2,353,445	6,137,774	78,486	44,301,906
Yuba	9,539,881	2,283,313	3,831,540	4,621,771	18,399	20,294,904
Totals	$2,456,226,344	$2,185,042,675	$1,166,088,004	$765,977,618	$77,682,871	$6,651,017,512

SCHEDULE 20.

Summary of Total Actual Values in Counties Based on 1916 Assessments.

County	Actual value, inside land	Actual value, improvements, inside	Actual value, outside acreage	Actual personal property	Actual money and credits	Grand total
Alameda	$249,219,386	$130,921,702	$53,867,509	$41,884,283	$3,359,652	$479,252,532
Alpine			1,536,996	180,451		1,717,447
Amador	760,663	1,397,344	11,514,000	1,958,449		15,630,456
Butte	4,614,313	4,807,812	37,940,804	8,738,931	89,715	56,191,575
Calaveras	275,396	677,253	15,636,772	2,567,580	32,320	19,189,321
Colusa	572,406	1,012,952	30,377,583	4,306,310	84,576	36,353,827
Contra Costa	31,749,396	15,024,839	54,972,963	21,450,807	5,173,959	128,371,964
Del Norte	259,020	321,970	11,913,771	656,565	650	13,151,976
El Dorado	414,533	927,114	14,620,906	2,343,681	1,561	18,307,795
Fresno	29,105,149	18,154,006	127,785,363	31,257,456	701,208	207,003,182
Glenn	678,908	1,388,663	18,880,361	4,124,054	21,594	25,093,580
Humboldt	13,602,973	6,292,726	116,508,630	14,223,463	290,909	150,918,701
Imperial	6,541,297	4,425,972	49,007,040	10,759,476		70,733,785
Inyo	773,925	617,690	15,926,639	3,193,195	30,675	20,542,124
Kern	16,808,704	9,017,391	165,761,314	53,834,086	13,940	245,435,435
Kings	1,975,838	2,356,143	28,629,299	7,588,321	34,987	40,584,588
Lake	614,095	437,598	10,252,475	1,524,734	40,725	12,869,627
Lassen	200,390	522,487	14,739,059	4,715,199	73,194	20,250,329
Los Angeles	923,170,678	311,284,174	246,554,544	170,611,382	28,097,151	1,679,717,929
Madera	1,406,907	804,115	27,012,188	3,807,098	182	33,066,490
Marin	12,331,332	9,960,164	25,075,790	4,258,245	33,089	51,658,620
Mariposa			7,373,379	1,613,677	3,786	8,990,842
Mendocino	2,913,886	2,033,265	34,864,131	7,102,571	204,366	47,118,219
Merced	1,935,913	2,217,709	46,036,548	10,253,552		60,443,722
Modoc	236,738	471,877	15,037,775	4,557,213	335,471	26,639,074
Mono			4,356,755	1,087,618		5,444,373
Monterey	7,625,954	5,377,748	54,862,250	11,678,675	1,301	79,545,928
Napa	4,917,038	4,679,440	22,962,298	5,860,451	104,080	38,523,307
Nevada	809,544	1,747,580	8,682,110	1,802,805	43,301	13,085,340
Orange	24,866,887	9,736,553	105,280,318	34,091,459	217,013	174,192,230
Placer	3,174,428	2,967,698	28,414,725	2,565,582	69,372	37,191,805
Plumas			16,319,209	2,802,800	63,940	19,185,949
Riverside	27,264,703	17,295,244	48,589,211	9,014,592		102,163,750
Sacramento	58,377,859	31,985,222	49,072,217	14,947,968	1,133,753	155,517,019
San Benito	1,285,554	1,413,888	16,940,513	3,955,761		23,595,716
San Bernardino	21,916,268	16,692,178	83,032,441	9,709,094	78,290	131,428,271
San Diego	92,348,157	39,741,705	45,151,711	18,230,320	2,672,711	198,144,604
San Francisco	616,532,161	376,021.278		84,855,731	49,297,115	1,126,706,285
San Joaquin	26,858,930	18,999,877	78,324,740	18,344,594	609,136	143,137,277
San Luis Obispo	3,051,533	3,974,715	47,118,121	22,270,250	4,384	76,419,003
San Mateo	18,484,897	13,396,157	60,943,352	6,044,069	850,258	99,718,733
Santa Barbara	11,350,780	12,875,559	37,366,438	14,058,303	24,727	75,675,807
Santa Clara	31,572,384	21,370,140	97,100,878	14,181,724	1,421,873	165,646,999
Santa Cruz	11,101,970	7,878,405	23,320,678	4,813,474	19,943	47,134,470
Shasta	1,213,006	1,820,503	30,090,176	4,210,476		37,334,161
Sierra	244,480	259,250	4,953,337	522,093	4,645	5,983,805
Siskiyou	1,964,241	2,273,212	30,505,796	7,588,275	133,296	42,464,820
Solano	5,156,809	5,412,736	24,519,266	4,878,482	31,320	39,998,613
Sonoma	9,730,265	8,704,624	75,789,035	13,842,868	429,730	108,496,522
Stanislaus	5,615,459	5,880,741	43,067,191	9,616,583	295,497	64,475,471
Sutter	399,929	404,808	17,067,209	2,244,387	41,508	20,157,841
Tehama	1,231,170	1,760,303	19,657,838	4,559,528	149,806	27,358,645
Trinity			7,465,253	1,048,714	21,117	8,535,084
Tulare	8,967,864	6,853,044	104,305,425	16,309,583	121,591	136,557,507
Tuolumne	584,833	1,233,562	16,153,884	2,604,358	8,108	20,584,745
Ventura	5,897,143	6,067,000	51,334,573	8,381,107	26,228	71,706,051
Yolo	1,677,058	2,512,849	33,945,750	4,974,336	44,728	43,154,721
Yuba	2,221,714	3,783,658	9,443,545	5,228,094	20,929	20,697,940
Grand totals	$2,306,604,864	$1,158,230,643	$2,477,962,082	$783,834,933	$96,563,410	$6,823,195,932

SCHEDULE 21.

Summary of Percentages of Assessed to Actual Values Upon Appraisals Made in Thirty-eight Counties (1915 Assessments).

County	Inside land	Inside improvements	Outside land and improvements	Business land	Business improvements	Total business	Residence land	Residence improvements	Total residence	Inside acreage
Alameda	.52284	.48552	.42449	.535	.468	.510	.507	.508	.507	.415
Butte	.28811	.48497	.33743	.286	.505	.414	.293	.532	.412	-------
Colusa	.53731	.47096	.43105	.527	.470	.490	-------	-------	-------	-------
Contra Costa	.33396	.50037	.42459	.248	.497	.387	.252	.521	.413	.371
Fresno	.46161	.51719	.38635	.459	.518	.483	.526	.586	.557	-------
Glenn	.75322	.66697	.60148	.722	.686	.697	.922	.529	.673	-------
Humboldt	.31933	.42182	.18562	.311	.428	.356	.351	.413	.383	-------
Imperial	.37509	.42251	.36700	.368	.418	.390	.431	.438	.436	-------
Kern	.25004	.43022	.31391	.251	.427	.357	.172	.444	.305	-------
Los Angeles	.41294	.47033	.48380	.413	.466	.427	.383	.534	.429	.471
Madera	.37821	.51349	.42334	.381	.512	.434	.315	.522	.452	-------
Marin	.44124	.47819	.36170	.416	.468	.439	.483	.478	.481	-------
Mendocino	.47066	.56035	.31908	.481	.540	.504	.390	.679	.517	-------
Napa	.43460	.61750	.37196	.443	.630	.547	.385	.565	.500	-------
Nevada	.56000	.69867	.46129	.595	.679	.660	.418	.793	.693	-------
Orange	.23748	.46583	.25879	.221	.466	.317	.317	.461	.385	.258
Placer	.27828	.48836	.25963	.429	.494	.473	.220	.587	.396	-------
Riverside	.24266	.34324	.29207	.229	.316	.256	.261	.385	.340	-------
Sacramento	.62063	.53939	.41783	.621	.539	.588	.528	.550	.541	-------
San Bernardino	.31726	.34724	.33299	.313	.363	.333	.299	.308	.305	.370
San Diego	.47269	.25141	.23888	.488	.255	.414	.363	.229	.311	-------
San Francisco	.49222	.46786	---------	.493	.469	.482	.522	.429	.463	.464
San Joaquin	.41335	.51504	.39171	.417	.495	.448	.344	.766	.532	-------
San Luis Obispo	.31504	.45938	.22912	.316	.475	.415	.304	.398	.379	-------
San Mateo	.40867	.31822	.38852	.203	.312	.257	.268	.370	.330	.530
Santa Barbara	.39779	.43038	.39010	.394	.386	.389	.416	.654	.561	.417
Santa Clara	.59168	.64604	.39136	.589	.620	.604	.680	.790	.742	-------
Santa Cruz	.48922	.42339	.33845	.498	.570	.531	.451	.423	.438	-------
Siskiyou	.37575	.50936	.39734	.374	.504	.476	.383	.549	.504	-------
Solano	.43347	.65270	.60978	.661	.687	.680	.508	.600	.582	-------
Sonoma	.43326	.59034	.30465	.439	.559	.488	.409	.666	.570	-------
Stanislaus	.40919	.48392	.46260	.403	.481	.455	.449	.503	.481	-------
Sutter	.48611	.61343	.57487	.581	.637	.629	.344	.539	.488	-------
Tehama	.51634	.70269	.49584	.517	.714	.679	.513	.639	.591	-------
Tulare	.32059	.49907	.31405	.329	.513	.418	.263	.437	.367	-------
Ventura	.38738	.36270	.41442	.371	.357	.364	.477	.341	.385	-------
Yolo	.44017	.64321	.49070	.410	.683	.590	.591	.663	.641	-------
Yuba	.37748	.35881	.43842	.370	.359	.362	.559	.346	.412	-------

SCHEDULE 22.

Summary of Percentages of Assessed to Actual Values Based on Appraisals and 1916 Assessments.

County	Inside land	Inside improvements	Outside land and improvements
Alameda	.51546	.47141	.42776
Butte	.28811	.48497	.35239
Colusa	.53731	.47096	.40301
Contra Costa	.33150	.46962	.42757
Fresno	.46120	.51868	.38806
Glenn	.69178	.67642	.66267
Humboldt	.31853	.42292	.18596
Imperial	.41651	.42167	.35836
Kern	.24619	.42751	.30663
Los Angeles	.45703	.49065	.52260
Madera	.39493	.51509	.42623
Marin	.49316	.46767	.37353
Mendocino	.47066	.56094	.32675
Napa	.46660	.61260	.41630
Nevada	.56000	.69642	.47817
Orange	.26008	.47429	.27294
Placer	.27722	.48079	.23524
Riverside	.24654	.34753	.28447
Sacramento	.60144	.52784	.48321
San Bernardino	.32037	.34109	.33368
San Diego	.47201	.25138	.24888
San Francisco	.49077	.46643	------------
San Joaquin	.40144	.57288	.39268
San Luis Obispo	.31504	.45938	.22912
San Mateo	.40788	.31779	.32764
Santa Barbara	.39385	.42482	.41393
Santa Clara	.58756	.65571	.39478
Santa Cruz	.48352	.41585	.33875
Siskiyou	.25281	.49176	.41142
Solano	.43709	.66093	.61168
Sonoma	.43274	.59123	.29877
Stanislaus	.40919	.47812	.46412
Sutter	.49305	.62537	.57529
Tehama	.53707	.70871	.48743
Tulare	.32114	.47021	.32160
Ventura	.41140	.28985	.41517
Yolo	.44017	.64321	.49070
Yuba	.38288	.36729	.43770

SCHEDULE 23.

Summary Showing Ratios of Assessed to Actual Values in Counties for the Years 1915 and 1916.

County	Grand total nonoperative assessed value, 1916	Total actual value, 1916	Ratio of assessed to actual value	Grand total nonoperative assessed value, 1915	Total actual value, 1915	Ratio of assessed to actual value
Alameda	$235,450,232	$479,252,532	.49128	$234,781,902	$466,860,070	.50289
Alpine	645,272	1,717,447	.37571	652,482	1,762,886	.37012
Amador	6,153,241	15,630,456	.39366	5.928,003	15,536,377	.38155
Butte	20,205,640	56,191,575	.35958	19,994,720	57,581,708	.34724
Calaveras	7,305,060	19,189,321	.38068	7,077,175	18,845,025	.37554
Colusa	14,816,640	36,353,827	.40756	14,635,551	33,774,498	.43333
Contra Costa	51,836.761	128,371,964	.40380	48,204,762	121,777,611	.39584
Del Norte	4,988,660	13,151,976	.37930	5,060,602	13,561,526	.37315
El Dorado	7,008,830	18,307,795	.38283	5,972,160	15,787,489	.37828
Fresno	85,651,020	207,003,182	.41376	84,096,576	203,947,242	.41234
Glenn	16,675,291	25,093,580	.66452	15,659,174	26,923,718	.58161
Humboldt	31,709,835	150,918,701	.21011	31,945,612	144,808,783	.22060
Imperial	26,127,208	70,733,785	.36937	24,703,359	66,277,144	.37272
Inyo	7,857,570	20,542,124	.38251	7,628,792	20,253,825	.37665
Kern	75,352,435	245,435,435	.30701	73,423,730	234,058,848	.31369
Kings	15,685,160	40,584,588	.38648	14,978,348	39,360,176	.38054
Lake	4,935,000	12,869,627	.38346	4,989,120	13,216,975	.37747
Lassen	7,701,968	20,250,329	.38033	7,610,821	20,266,759	.37553
Los Angeles	797,886,221	1,679,717,929	.47501	707,836,360	1,603,988,244	.44129
Madera	14,128,507	33,066,490	.42727	13,669,885	32,231,644	.42411
Marin	21,927,450	51,658,620	.42446	21,405,790	52,589,055	.40703
Mariposa	3,384,438	8,990,842	.37643	3,298,122	8,897,736	.37066
Mendocino	16,420,796	47,118,219	.34850	16,000,948	45,803,287	.34934
Merced	23,134,890	60,443,722	.38275	22,798,845	60,623,770	.37607
Modoc	7,847,101	20,639,074	.38020	7,749,048	20,698,213	.37438
Mono	2,050,470	5,414,373	.37662	1,139,300	3,064,674	.37175
Monterey	31,131,859	79,545,928	.39136	30,193,019	78,366,181	.38528
Napa	17,416,685	38,523,307	.45210	16,408,405	39,432,714	.41611
Nevada	6,778,185	13,085,340	.51799	6,633,455	13,483,926	.49195
Orange	49,586,790	174,192,230	.28466	48,248,675	166,798,423	.28926
Placer	9,937,454	37,191,805	.26719	11,163,901	39,911,097	.27971
Plumas	7,216,602	19,185,949	.37613	6,911,342	18,656,262	.36845
Riverside	29,124,593	102,163,750	.28507	28,029,795	95,305,568	.29410
Sacramento	84,980,396	155,517,019	.54643	85,078,484	165,764,856	.51321
San Benito	9,131,375	23,595,716	.38699	8,391,025	22,003,488	.38134
San Bernardino	43,673,365	131,428,271	.33229	42,680,463	126,888,929	.33636
San Diego	72,460,912	198,144,604	.36569	70,028,197	189,646,672	.36925
San Francisco	542,563,056	1,126,706,285	.48154	538,692,750	1,132,359,489	.47572
San Joaquin	60,424,586	143,137,277	.42214	58,685,258	140,536,176	.41755
San Luis Obispo	19,170,779	76,419,003	.25086	18,896,537	66,398,476	.28459
San Mateo	34,123,435	99,718,733	.34219	33,835,975	87,675,941	.38592
Santa Barbara	31,216,640	75,675,807	.41250	29,785,325	71,534,262	.41637
Santa Clara	78,269,470	165,646,999	.47250	77,848,250	167,490,093	.46479
Santa Cruz	18,434,490	47,134,470	.39110	18,606,915	47,301,695	.39336
Shasta	14,352,430	37,334,161	.38443	12,439,095	32,862,646	.37848
Sierra	2,294,230	5,983,805	.38340	2,330,005	6,157,307	.37841
Siskiyou	17,313,235	42,464,820	.40770	17,293,390	42,454,321	.40734
Solano	23,743,883	39,998,613	.59361	23,284,041	41,220,813	.56486
Sonoma	36,847,860	108,496,522	.33962	37,294,230	105,237,033	.25438
Stanislaus	29,657,095	64,475,471	.45997	29,155,600	64,247,840	.45379
Sutter	11,582,365	20,157,841	.57458	11,462,295	20,727,245	.55300
Tehama	13,879,730	27,358,645	.50732	14,035,770	28,366,466	.49480
Trinity	3,208,420	8,535,084	.37590	3,180,545	8,588,172	.37034
Tulare	45,067,880	136,557,507	.33002	44,606,180	133,729,837	.33355
Tuolumne	7,909,346	20,584,745	.38423	8,010,597	21,187,673	.37807
Ventura	28,883,655	71,706,051	.40280	28,413,561	69,589,818	.40830
Yolo	21,515,475	43,154,721	.49856	21,597,680	44,301,906	.48751
Yuba	8,539,380	20,697,940	.41257	8,393,800	20,294,904	.41359
Totals	$2,917,323,351	$6,823,195,932	.42755	$2,792,855,747	$6,651,017,512	.41991

SCHEDULE 24.

Comparative Cost of County Governments,* 1912 and 1916.

County	Total general county tax levy 1912	Total general county tax levy 1916	1912 rate		1916 rate	
			Inside	Outside	Inside	Outside
Alameda	$1,695,659 54	$2,500,889 72	$.88	$1.28	$1.00	$1.40
Alpine	8,552 59	8,711 16	----------	2.00	----------	1.35
Amador	129,586 62	114,438 03	1.70	2.00	1.60	2.00
Butte	303,572 14	547,139 68	1.60	2.00	2.40	2.80
Calaveras	115,500 10	147,602 89	1.95	2.35	1.65	2.05
Colusa	128,763 12	275,963 23	1.10	1.60	1.35	1.90
Contra Costa	435,767 49	925,995 00	1.10	1.50	1.55	1.95
Del Norte	80,995 39	92,401 53	1.20	1.70	1.30	1.90
El Dorado	105,994 72	142,495 00	1.60	2.00	1.70	2.10
Fresno	678,612 49	1,311,764 59	1.18	1.58	1.26	1.66
Glenn	226,422 12	274,504 75	1.20	1.60	1.29	1.69
Humboldt	291,034 15	717,407 89	1.03	1.55	1.86	2.40
Imperial	287,946 32	502,083 26	1.20	1.80	1.48	2.05
Inyo	89,124 79	123,239 21	1.35	1.75	1.30	1.60
Kern	616,873 07	887,132 00	.85	1.20	.85	1.20
Kings	181,828 82	360,831 27	.99	1.52	1.80	2.40
Lake	76,573 18	100,311 98	1.50	1.90	1.59	2.09
Lassen	58,496 64	152,201 93	1.60	2.00	1.60	2.00
Los Angeles	3,036,460 42	7,042,760 23	.80	1.30	.81	1.21
Madera	188,092 01	263,603 60	1.15	1.55	1.50	1.90
Marin	143,490 89	372,456 41	.97	1.32	1.40	1.75
Mariposa	65,147 02	64,304 31	----------	1.75	----------	1.90
Mendocino	204,881 44	366,483 77	1.30	1.90	1.75	2.35
Merced	248,846 09	448,134 21	1.40	2.00	1.40	2.00
Modoc	64,948 89	131,713 54	.85	1.20	1.30	1.70
Mono	25,375 44	41,009 40	----------	2.25	----------	2.60
Monterey	362,919 90	532,576 90	1.20	1.70	1.40	1.80
Napa	228,093 82	307,337 03	1.20	1.60	1.39	1.76
Nevada	90,777 82	152,384 63	1.80	2.30	1.90	2.40
Orange	312,781 89	906,204 10	1.05	1.45	1.55	1.95
Placer	307,337 76	252,252 94	1.60	2.00	2.25	2.65
Plumas	90,315 38	133,507 12	----------	1.60	----------	1.85
Riverside	279,943 72	663,125 76	1.60	2.20	1.97	2.57
Sacramento	830,059 36	1,330,593 00	1.17	1.64	1.373	1.96
San Benito	89,909 32	215,204 00	1.75	1.95	2.15	2.40
San Bernardino	557,749 22	1,025,668 90	1.35	1.95	2.14	2.53
San Diego	660,771 08	1,355,410 58	1.45	2.00	1.75	2.45
San Francisco	10,001,282 19	12,641,717 00	2.094	----------	2.33	----------
San Joaquin	1,409,932 83	1,042,301 79	1.25	1.65	1.50	1.90
San Luis Obispo	362,695 48	386,712 00	1.35	1.85	1.69	2.25
San Mateo	270,331 98	704,736 72	1.00	1.60	1.82	2.22
Santa Barbara	350,474 41	609,874 00	1.40	2.00	1.60	2.15
Santa Clara	486,810 32	1,349,728 19	1.05	1.45	1.50	1.92
Santa Cruz	308,089 95	368,405 51	1.40	2.00	1.70	2.30
Shasta	195,015 18	327,099 56	1.85	2.25	1.93	2.33
Sierra	46,974 39	50,203 62	1.55	2.05	1.75	2.25
Siskiyou	258,721 61	313,399 97	1.10	1.50	1.46	1.86
Solano	258,755 97	439,341 00	1.20	1.60	1.57	1.97
Sonoma	514,362 75	617,484 06	1.20	1.60	1.40	1.80
Stanislaus	400,880 75	567,896 52	1.40	1.80	1.60	2.00
Sutter	114,787 50	183,197 98	1.60	2.00	1.10	1.50
Tehama	275,760 59	377,943 82	1.35	1.75	2.37	2.80
Trinity	75,006 14	80,210 47	----------	2.50	----------	2.50
Tulare	799,546 43	946,446 90	1.10	1.70	1.60	2.20
Tuolumne	109,758 66	163,521 49	1.40	1.90	1.66	2.13
Ventura	269,382 09	590,829 37	1.30	1.60	1.82	2.15
Yolo	304,172 25	391,762 23	.95	1.55	1.30	1.90
Yuba	133,917 75	193,147 92	2.30	2.70	2.00	2.40
Totals	$30,245,863 98	$47,135,803 67				

*Note—Increase in assessments should also be considered.

SCHEDULE 25.

Summary of Total Rentals and Assessed Values.

County	Number of properties					County assessed value, 1915	City assessed value, 1915	Rental income, 1915	County and city taxes, 1915	Per cent of tax to income
	Business	Residence	Stores and apartments	Acreage	Totals					
Alameda	31	7	92		130	$1,816,891 00	$1,655,225 00	$348,455 10	$59,990 15	.172
Butte	16	9		9	34	190,685 00	190,685 00	39,912 00	9,922 93	.248
						Assessment	not reported	23,793 00	3,872 34	.162
Contra Costa				4	4	469,040 00		30,196 64	9,654 05	.319
Fresno	18	27	5		50	1,513,943 00	1,513,943 00	313,156 84	48,446 17	.154
Kern	14	15			29	497,995 00	653,704 00	101,056 00	19,485 72	.192
Kings	Not	reported						3,484 13	520 64	.149
Los Angeles	83	91	18		192	1,916,061 00	2,380,235 00	417,224 59	63,828 35	.152
						Assessment	not reported	385,018 12	74,813 60	.194
Modoc	Not	reported				4,056 00		1,000 00	77 86	.077
Napa	30	19			49	355,700 00	355,700 00	65,166 00	11,145 38	.171
Orange	11	8	4		23	164,105 00	164,105 00	43,410 00	8,172 35	.188
Riverside	15	6	6		27	531,240 00	531,240 00	111,226 00	23,533 91	.211
San Bernardino	27	15	3	3	48	638,230 00	638,230 00	111,490 00	17,228 44	.154
San Diego	14	13			27	569,770 00	754,270 00	94,776 00	26,663 11	.281
San Francisco	59	17	16		92	9,910,530 00		1,631,311 86	222,852 03	.136
San Joaquin	23	25	5		53	1,036,640 00	1,261,065 00	210,472 50	41,052 60	.195
San Luis Obispo	Not	reported				187,475 00		16,000 00	4,449 18	.278
San Mateo	14	32			46	183,550 00	213,555 00	72,603 00	7,191 91	.099
Santa Clara	47	29	2		78	1,707,780 00	1,712,440 00	244,600 35	51,457 28	.210
Santa Cruz	26	15	2	2	45	576,550 00	576,550 00	95,988 00	21,807 65	.227
Shasta	2	8		3	13	82,658 00	59,070 00	12,934 00	3,070 68	.237
Solano	53	41	20		114	564,160 00	671,950 00	131,304 00	23,002 32	.175
Sonoma	18	22	1	4	45	344,850 00	332,202 00	57,335 40	9,855 08	.171
Tehama	5	8		1	14	28,288 00	28,288 00	4,611 00	1,176 78	.255
						Assessment	not reported	1,860 00	886 60	.476
Tulare	13	10			23	198,920 00	272,057 00	38,544 00	10,349 46	.268
Yuba	4	16	3	1	24	152,910 00	203,300 00	34,068 00	8,930 90	.255
Totals	523	433	177	27	1,160	$23,642,027 00	$14,167,814 00	$4,640,996 53	$783,437 47	.168

SCHEDULE 26.

Summary of Report on Rentals (Business Property).

County	County assessed value, 1915	City assessed value, 1915	Rental income, 1915	County and city taxes, 1915	Per cent of tax to income
Alameda	$1,409,678 00	$1,292,775 00	$264,585 25	$46,255 94	.174
Butte	161,135 00	161,135 00	34,704 00	8,382 29	.241
Fresno	1,374,493 00	1,374,493 00	280,863 64	43,983 77	.156
Kern	457,355 00	604,670 00	91,996 00	17,980 04	.195
Los Angeles	1,714,090 00	2,129,605 00	674,264 55	104,962 37	.155
Napa	324,850 00	324,850 00	60,054 00	10,176 28	.169
Orange	122,625 00	122,625 00	32,412 00	6,106 69	.188
Riverside	302,930 00	302,930 00	62,014 00	13,419 79	.216
San Bernardino	552,080 00	552,080 00	101,002 00	15,187 63	.150
San Diego	511,600 00	652,220 00	80,880 00	23,492 69	.291
San Francisco	9,608,250 00	--------------	1,549,431 86	216,075 81	.139
San Joaquin	877,025 00	1,076,400 00	181,642 50	34,932 40	.192
San Mateo	147,450 00	172,730 00	59,700 00	5,682 58	.095
Santa Clara	1,660,390 00	1,664,175 00	236,092 35	49,925 26	.211
Santa Cruz	519,350 00	519,350 00	83,388 00	19,782 47	.237
Shasta	47,792 00	47,792 00	8,950 00	1,959 50	.218
Solano	308,960 00	352,660 00	69,846 00	12,293 77	.176
Sonoma	280,575 00	295,367 00	47,534 40	8,722 23	.183
Tehama	16,510 00	16,510 00	2,220 00	686 80	.309
Tulare	187,825 00	256,124 00	36,084 00	9,758 33	.270
Yuba	79,770 00	113,780 00	17,752 00	4,800 10	.270
Totals	$20,664,733 00	$12,032,271 00	$3,975,416 55	$654,566 74	.164

SCHEDULE 26—Continued.

Summary of Report on Rentals (Residence Property).

County	County assessed value, 1915	City assessed value, 1915	Rental income, 1915	County and city taxes, 1915	Per cent of tax to income
Alameda	$339,763 00	$296,100 00	$64,555 85	$11,613 44	.179
Butte	29,550 00	29,550 00	5,208 00	1,540 64	.295
Fresno	56,750 00	56,750 00	10,627 20	1,816 00	.170
Kern	40,640 00	49,034 00	9,060 00	1,505 68	.166
Los Angeles	102,211 00	113,180 00	50,898 58	12,094 62	.237
Napa	30,850 00	30,850 00	5,112 00	969 10	.189
Orange	8,370 00	8,370 00	1,650 00	416 79	.252
Riverside	9,285 00	9,285 00	1,452 00	411 32	.283
San Bernardino	25,680 00	25,680 00	3,828 00	658 20	.171
San Diego	58,170 00	102,050 00	13,896 00	3,170 42	.228
San Francisco	101,670 00	--------------	24,437 00	2,288 77	.093
San Joaquin	73,115 00	70,395 00	13,026 00	2,522 09	.193
San Mateo	36,100 00	40,825 00	12,903 00	1,509 33	.116
Santa Clara	43,105 00	44,275 00	6,912 00	1,391 17	.201
Santa Cruz	35,790 00	35,790 00	6,540 00	1,274 65	.194
Shasta	11,278 00	11,278 00	2,434 00	462 51	.190
Solano	81,770 00	100,660 00	16,278 00	3,400 42	.208
Sonoma	22,875 00	28,835 00	3,966 00	785 35	.071
Tehama	11,778 00	11,778 00	2,391 00	489 98	.204
Tulare	11,095 00	15,933 00	2,460 00	591 13	.240
Yuba	47,280 00	60,610 00	10,104 00	2,722 11	.269
Totals	$1,177,125 00	$1,141,228 00	$267,738 63	$51,633 72	.192

SCHEDULE 27.

Summary of Report on Rentals (Stores and Apartments).

County	County assessed value, 1915	City assessed value, 1915	Rental income, 1915	County and city taxes, 1915	Per cent of tax to income
Alameda	$67,450 00	$66,350 00	$19,314 00	$2,120 77	.109
Fresno	82,700 00	82,700 00	21,666 00	2,646 40	.122
Los Angeles	99,760 00	137,450 00	77,079 58	21,584 96	.280
Orange	33,110 00	33,110 00	9,348 00	1,648 87	.176
Riverside	219,025 00	219,025 00	47,760 00	9,702 80	.203
San Bernardino	47,395 00	47,395 00	5,160 00	857 00	.166
San Francisco	200,610 00	----------------	57,443 00	4,487 45	.078
San Joaquin	86,500 00	114,270 00	15,804 00	3,598 11	.227
Santa Clara	4,285 00	3,990 00	1,596 00	140 85	.088
Santa Cruz	16,410 00	16,410 00	5,520 00	541 53	.098
Solano	173,430 00	218,630 00	45,180 00	7,308 13	.161
Sonoma	7,000 00	8,000 00	900 00	253 40	.281
Yuba	24,760 00	28,910 00	6,012 00	1,374 59	.228
Totals	$1,062,435 00	$976,240 00	$312,782 58	$56,264 86	.179

SCHEDULE 27—Continued.

Summary of Report on Rentals (Acreage).

County	County assessed value, 1915	Rental income, 1915	County taxes, 1915	Per cent of tax to income
Butte	----------------	$23,793 00	$3,872 34	.162
Contra Costa	$469,040 00	30,196 64	9,654 05	.319
Kings	----------------	3,484 13	520 64	.149
Modoc	4,056 00	1,000 00	77 86	.077
San Bernardino (Inside)	13,075 00	1,500 00	525 61	.350
San Luis Obispo	187,475 00	16,000 00	4,449 18	.278
Santa Cruz (Inside)	5,000 00	540 00	209 00	.387
Shasta	23,588 00	1,550 00	648 67	.418
Sonoma	34,400 00	4,935 00	94 10	.019
Tehama	----------------	1,860 00	886 60	.476
Yuba	1,100 00	200 00	34 10	.17
Totals	$737,734 00	$85,058 77	$20,972 15	.243

SCHEDULE 28.

Summary of City Clerks' Reports for the Year 1916.

County and city	Nonoperative assessed values					Operative, assessed values				
	Land	Improvements	Personal property	Money and credits	Total assessed value, nonoperative roll	Land	Improvements	Personal property	Money and credits	Railroad property by State Board of Equalization
Alameda—										
Alameda	$10,974,200	$7,501,650	$1,387,000	$116,250	$19,979,100	$350,175	$149,000	$670,750		$366,979
Albany	2,953,375	150,300	67,225		3,170 900	166,667	13,950	100		
Berkeley	25,966,580	16,499,495	2,415,019		44,881,094	420,550	104,000	1,590,612	$408,673	
Emeryville	1,722,125	525,475	774,400	66,050	3,088,050					
Hayward	1,389,100	658,000	126,900		2,174,000	20,550	80,750	53,300		41,341
Livermore	309,450	436,900	185,845		932,195	8,800	33,455	12,450		55,706
Oakland	82,437,200	46,807,850	15,605,200	94,800	144,945,050	2,592,700	2,151,000	14,225,450		468,398
Piedmont	4,973,918	1,430,483	520,545		6,924,946	57,610		94,510		
Pleasanton	202,700	217,700	62,900		483,300	5,450	16,225	530		29,801
San Leandro	1,686,462	783,350	143,675	41,000	2,654,487	7,725	19,607	150,925		80,464
Amador—										
Jackson	581,433	48,568			630,001	39,785				
Sutter Creek	126,115	192,390	75,535		394,040					
Butte—										
Biggs	37,210	109,195	107,060	900	254,365					
Chico	1,252,930	1,172,680	451,774		2,877,354	19,000	35,220	111,737		
Gridley	103,390	250,370	119,485	345	473,590	750	7,315	565		21,800
Oroville	467,175	856,910	344,295	3,360	1,671,740	13,200	65,525	1,775		45,690
Calaveras—										
Angels	476,190		46,580	14,535	537,305	60,260	72,780	44,010		
Colusa—										
Colusa	405,882	583,245	233,092		1,222,219	3,450	1,300	30,915		
Contra Costa—										
Antioch	335,170	309,795	180,650		825,615			15,840		36,015
Concord	112,107	194,370	68,780		375,257	4,500				16,537
Hercules	136,380	589,955	68,340	100,200	894,875					
Martinez	662,405	787,440	475,365		1,925,210	3,075	36,915	6,765	22,530	60,109
Pinole	52,785	98,815	20,675		172,275					49,653
Pittsburg	357,625	398,650	133,215		889,490		36,995			
Richmond	11,022,845	3,628,320	2,662,120	13,000	17,326,285					
Walnut Creek	99,270	93,165	31,175		223,610					

Del Norte—										
Crescent City	157,097	144,680	101,273		403,050					
El Dorado—										
Placerville	193,015	438,985	172,930	600	805,530	2,275	20,145	8,630	800	43,296
Fresno—										
Clovis	206,060	123,330	127,425	250	457,065	700	1,000	31,375	5,665	26,400
Coalinga	388,590	404,500	272,712	12,387	1,078,189	8,990	10,300	44,130		19,312
Firebaugh	58,065		6,165		64,230					
Fowler	155,720	141,650	149,975	2,660	450,005	1,250	6,000	15,383		22,890
Fresno	11,596,555	7,764,385	3,037,687	179,585	22,578,212	222,475	137,860	1,414,737	262,250	186,393
Kingsburg	160,845	145,615	180,220	6,600	493,280	69,980				
Reedley	337,320	231,875	186,990	13,275	769,460	13,070	4,755	39,745	15,255	71,200
Sanger	204,495	180,675	136,870	700	522,740	2,500	1,500	65,325	11,975	34,000
Selma	351,580	398,950	343,300	2,070	1,095,900	4,020	4,500	163,860	20,555	24,634
Glenn—										
Orland	248,165	231,606	88,921		568,692	950	3,200	6,066	22,670	4,400
Willows	778,230	549,815	266,512	6,300	1,600,857	3,800	1,950	43,050		27,200
Humboldt—										
Arcata	430,335	319,640	171,765		921,740	15,700	5,530	27,590		
Blue Lake	39,465	59,565	8,290		107,320	500	400			3,055
Eureka	5,217,112	1,961,570	724,140	28,126	7,930,948	135,770	82,213	415,781		55,419
Ferndale	260,550	165,390	111,810		537,750			59,360		
Fortuna	158,500	201,640	98,655		458,795					
Imperial—										
Brawley	989,422	320,938	262,159		1,572,520	57,460	30,222	62,454		
Calexico	1,728,745	348,835	217,685		2,295,265					
El Centro	2,164,927	1,008,325	317,486		3,490,738	131,083	33,700	5,960		
Holtville	413,105	214,970	101,735	3,050	732,860	50,800	22,200	22,000		
Imperial	800,525	356,625	218,782		1,375,932	29,450	6,500	37,961		
Inyo—										
Bishop	432,855	291,560	174,300	2,090	900,805		16,500	192,945		
Kern—										
Bakersfield	7,833,880	3,970,945	1,289,110	15,085	13,109,020	261,110	236,385	195,075	372,710	645,165
Delano	116,497	63,530	37,736		217,763	750	2,500	5,410		
Maricopa	215,416	211,745	158,400		585,561		57	150		
McKittrick	79,300	11,450	29,850		120,600					
Taft	357,725	184,455	287,310		829,490					
Tehachapi	53,520	70,575	41,195		165,290					
Kings—										
Corcoran	191,629	145,465	103,849		440,943					
Hanford	1,852,870	2,234,830	938,770	12,030	5,038,500	5,408	103,629	100,548	153,500	57,336
Lemoore	246,937	141,675	168,161	3,450	560,223	9,000	3,000	51,481		15,840
Lake—										
Lakeport	285,935	205,785	70,715	3,370	565,805	25	50	12,360		

SCHEDULE 28—Continued.

Summary of City Clerks' Reports for the Year 1916.

County and city	Nonoperative assessed values					Operative, assessed values				
	Land	Improvements	Personal property	Money and credits	Total assessed value, nonoperative roll	Land	Improvements	Personal property	Money and credits	Railroad property by State Board of Equalization
Lassen—										
Susanville	$93,306	$245,705	$116,287	$3,929	$459,227		$8,000	$14,599		
Los Angeles—										
Alhambra	5,721,583	2,573,662	924,562	29,630	9,249,437	$110,020	9,960	488,083		$176,360
Arcadia	2,885,210	225,790	69,070		3,180,070	48,550	31,050	95,340		
Avalon	728,120	102,990	97,777	3,130	932,017	1,330	1,070	7,300		
Azusa	1,196,160	355,230	83,973		1,635,363	9,380	51,856	97,559		
Beverly Hills	2,703,235	433,015	488,525	36,995	3,661,770					
Burbank	1,834,480	353,141	137,880	4,370	2,329,870	46,785	3,990	80,615	$22,415	245,392
Claremont	840,320	549,095	133,405	33,705	1,556,525	206,830				
Compton	661,350	121,320	107,245	11,080	900,995	113,595	2,550	57,005	23,395	50,424
Covina	421,045				1,212,570					
Eagle Rock	1,463,205	583,815	57,883	1,600	2,106,503					
El Monte	271,085	111,820	55,209		438,124	12,610	4,655	140		
Glendale	3,044,640	1,665,430	244,560		4,954,630					
Glendora	592,790	400,355	82,100	25,365	1,100,610					
Hermosa Beach	1,925,863	380,493	36,834		2,343,190	79,280	17,700	39,755		39,362
Huntington Park	1,723,479	331,310	40,280		2,095,069	53,190	140	72,918		
Inglewood	1,287,065	378,825	136,934	22,170	1,824,994			347,885		46,400
Long Beach	20,569,154	8,506,735	2,378,085	92,490	31,546,464	561,520	317,375	2,262,900	501,750	213,653
Lordsburg	418,020	247,340	80,365		745,725					
Los Angeles	311,090,700	110,864,510	53,667,680	6,702,430	482,325,320	19,791,965	2,142,990	42,867,210	916,245	2.736,260
Manhattan Beach	1,911,570	120,260	29,790	500	2,062,120	33,280	43,840			50,112
Monrovia	2,610,830	1,259,620	195,355	35,365	4,101,170					
Pasadena	33,447,995	15,609,555	6,544,325	2,154,305	57,756,180	535,770	625,535	1,589,240	532,590	185,214
Pomona	4,662,435	2,675,585	434,838		7,772,858	88,760	230,079	244,555		
Redondo Beach	2,581,570	613,125	293,061		3,487,756	178,670	226,970	1,067,224	2,500	25,056
San Fernando	625,945	316,040	106,535	3,565	1,052,085					31,008
San Gabriel	1,316,970	294,430	76,840	14,165	1,702,405	171,935				
San Marino	2,496,220	698,155	340,830	4,010	3,539,215					57,552
Santa Monica	11,135,135	3,763,100	1,137,295	13,930	16,049,460	473,130	277,055	339,210		
Sawtelle	1,206,177	493,710	132,016		1,831,903					
Sierra Madre	1,106,530	394,530	64,915	610	1,566,585					
South Pasadena	3,659,315	1,824,095	744,460	85,385	6,282,845	730,855	141,648			

Los Angeles—Continued.										
Tropico	827,410	360,905	143,305	920	1,332,540	86,460	330	65,235	-----	62,578
Venice	7,003,315	2,994,075	540,875	450	10,538,715	44,550	78,925	26,270	-----	734,225
Vernon	2,205,505	421,945	688,795	78,490	3,391,235	-----	-----	-----	-----	-----
Watts	872,525	238,745	33,515	2,625	1,147,410	-----	-----	-----	-----	-----
Whittier	2,420,800	1,829,259	249,517	-----	3,959,576	10,225	7,900	91,112	-----	-----
Madera—										
Madera	555,630	432,735	221,064	78	1,209,507	18,035	12,150	29,210	-----	43,164
Marin—										
Belvedere	379,454	252,155	129,809	-----	761,418	-----	-----	3,726	-----	-----
Larkspur	508,065	134,800	30,575	-----	673,440	-----	-----	-----	-----	-----
Mill Valley	1,636,480	749,450	103,800	-----	2,489,730	45,365	22,203	-----	-----	-----
Ross	635,475	446,905	122,032	-----	1,204,412	500	620	-----	-----	14,045 10,891
San Anselmo	1,041,970	677,725	39,890	-----	1,757,130	1,500	450	42,207	-----	32,760
San Rafael	2,497,780	2,075,827	441,281	3,950	5,018,838	16,000	20,050	171,115	-----	64,837
Sausalito	1,298,900	682,000	938,000	-----	2,918,900	354,922	-----	-----	-----	-----
Mendocino—										
Fort Bragg	274,137	243,075	237,148	-----	754,360	-----	-----	-----	-----	-----
Point Arena	68,530	52,960	37,440	-----	158,930	-----	1,041	310	-----	-----
Potter Valley	378,020	56,445	67,520	-----	501,985	-----	-----	-----	-----	-----
Ukiah	427,325	518,400	116,625	1,465	1,063,815	4,300	19,500	9,790	-----	13,650
Willits	194,110	220,760	123,220	1,700	539,790	750	11,572	6,494	-----	20,475
Merced—										
Los Banos	255,240	218,835	170,685	-----	644,760	1,450	4,685	11,255	-----	24,480
Merced	623,085	798,925	286,805	-----	1,708,815	11,565	32,000	94,430	-----	95,969
Modoc—										
Alturas	120,423	237,990	111,250	-----	469,663	-----	-----	-----	-----	-----
Monterey—										
King City	159,345	127,155	91,737	-----	378,237	3,000	500	1,769	688	22,704
Monterey	1,507,841	877,181	286,547	-----	2,671,569	27,100	18,100	125,772	-----	-----
Pacific Grove	1,414,278	786,960	184,402	-----	2,385,640	2,070	3,000	14,897	-----	70,968
Salinas	1,194,045	823,875	356,888	13,800	2,388,608	14,100	28,800	62,890	-----	70,224
Napa—										
Calistoga	234,945	264,675	102,435	1,850	598,355	-----	-----	-----	-----	-----
Napa	1,713,795	2,110,280	848,380	38,300	4,710,755	11,750	8,560	63,485	-----	50,812
St. Helena	476,445	618,750	255,205	2,855	1,353,255	-----	-----	-----	-----	-----
Nevada—										
Grass Valley	443,414	863,182	210,080	6,330	1,522,926	-----	-----	-----	-----	-----
Nevada City	157,460	576,323	127,215	-----	860,997	1,600	6,700	32,141	-----	-----
Orange—										
Anaheim	1,082,595	856,065	225,385	-----	2,164,045	11,065	5,000	64,145	-----	129,635
Fullerton	-----	-----	-----	-----	4,278,705	-----	-----	-----	-----	-----
Huntington Beach	2,153,925	236,040	72,935	125	2,463,025	-----	-----	-----	-----	-----

SCHEDULE 28—Continued.

Summary of City Clerks' Reports for the Year 1916.

County and city	Nonoperative assessed values					Operative, assessed values				
	Land	Improvements	Personal property	Money and credits	Total assessed value, nonoperative roll	Land	Improvements	Personal property	Money and credits	Railroad property by State Board of Equalization
Orange—Continued										
Newport Beach	$1,700,020	$407,745	$84,735		$2,192,509	$2,626	$1,850	$89,101		
Orange	1,541,165	815,615	367,375	$5,280	2,727,435	10,540	106,209	21,215		
Santa Ana	3,618,900	2,438,700	702,750	26,110	6,786,460	46,690	27,500	144,690	$145,895	$142,142
Stanton	293,005	33,375	15,440		341,820	3,900	3,000	59,000	15,500	120,278
Placer—										
Auburn	441,607	589,651	322,095	1,200	1,354,553			16,330		53,470
Colfax	35,150	105,745	44,840		185,735					
Lincoln	117,055	328,595	95,005	8,000	548,655	2,500	2,400	13,498		38,150
Rocklin	63,519	91,997	42,335		197,851	63,519	91,997	42,335		31,500 1.200
Roseville	405,953	492,725	118,980		1,017,658	13,600		62,706		
Riverside—										
Banning	280,960	205,910	68,870		555,740	730	3,900	5,420		81,872
Beaumont	137,650	113,510	36,850		288,010	6,540	20,600			11,880
Corona	2,217,785	1,802,045	329,255		4,349,085	10,110	28,420	97,988		50,112
Elsinore	249,943	117,590	23,980		391,513	5,540	7,861			112,752
Hemet					655,270					
Perris					158,050					
Riverside	4,468,350	4,258,250	979,270		9,705,870	19,610	265,750	313,770	425,000	471,867
San Jacinto	159,579	121,150	45,360		326,080	280	3,950	17,130	6,700	15,544
Sacramento—										
Sacramento	41,201,682	20,281,851	6,250,618		67,734,151	2,326,500	2,104,200	1,139,650		298,536
San Benito—										
Hollister	557,255	615,380	245,805		1,418,440	5,605	36,565	36,585	299,915	19,860
San Juan	64,680	61,065	20,780		146,525			2,200		
San Bernardino—										
Chino	$503,030	$272,670	$440,050		$1,215,750					
Colton					1,373,275	141,060				147,192
Needles	195,035	230,775	152,425	600	578,835	292,730		76,165		36,009
Ontario	1,612,820	1,071,310	205,075	525	2,889,730					
Redlands	4,295,440	3,770,975	797,365	10,780	8,874,560	116,990	259,610	110,265		203,735
Rialto	1,058,378	374,525	137,025		1,569,928	2,610				50,510
San Bernardino	3,039,980	2,038,540	542,565		5,621,085		1,359,575		105,775	171,600
Upland	1,022,760	644,135	109,780	5,300	1,781,975		275,120			

San Diego—										
Chula Vista	1,211,406	94,922	36,645		1,328,028	8,850	12,030	41,300		
Coronado	2,360,675	906,615	206,751		3,474,041	12,755	15,304	79,386		
East San Diego	2,345,445	426,565	30,059	20,000	2,822,069					
El Cajon	245,591	81,245	45,302	175	372,308					
Escondido	660,120	411,895	168,943		1,240,958					
La Mesa	331,953	106,605	16,810	1,250	456,618					
National City	2,026,605	366,700	74,830		2,468,135	156,625	261,739	30,629		34,336
Oceanside	455,570	154,842	41,061		651,473	8,518	14,939	91,192		
San Diego	72,796,392	5,687,485	5,147,591	353,177	83,984,645	1,289,675	377,515	2,943,082	2,584	538,742
San Joaquin—										
Lodi	731,746	990,395	296,100	13,904	2,032,145	95,180	106,373	13,302		64,918
Stockton	13,258,058	9,984,025	3,854,238	46,442	27,142,763	587,455	290,281	657,691	500	339,760
Tracy	202,175	296,540	151,352	17,462	667,529					
San Luis Obispo—										
Arroyo Grande	173,019	151,015	47,194		371,228	15,510				
El Paso De Robles	401,305	344,530	194,182		940,017	4,030	20,270	5,930		85,136
San Luis Obispo	1,441,893	1,386,550	467,935		3,296,378	12,325	79,250	243,463	182,408	70,667
San Mateo—										
Burlingame	2,304,165	689,940	29,920		3,023,925	51,168	3,000	100		
Daly City	1,211,405	313,325	30,110		1,554,840					
Hillsborough	2,321,725	999,200	329,805	153,000	3,803,730					
Redwood City	1,375,835	728,360	212,515		2,316,710	13,250	18,500	54,645	40,000	48,960
San Bruno	1,151,670	110,600	109,575		1,353,655	625	3,445	25,450		63,504
San Mateo	2,208,555	1,187,205	163,470		3,559,230	21,350	10,500	100,640	39,065	57,936
South San Francisco	986,550	537,660	236,450		1,760,660					
Santa Barbara—										
Lompoc	322,222	307,563	167,346		797,131	4,740	2,600	25,800	75	52,800
Santa Barbara	4,368,995	5,363,525	1,340,750		11,073,270	60,000	70,375	743,120		177,616
Santa Maria	557,080	445,750	226,524		1,229,354					
Santa Clara—										
Alviso	168,745	32,240	24,395	540	225,920	2,030	18,050	6,000		38,630
Gilroy	360,289	121,265	139,444		860,998	7,355	14,110	16,794		41,616
Los Gatos	830,412	850,216	174,887		1,855,515	14,540	45,650	2,541		39,343
Mayfield	377,155	142,150	23,310	2,180	544,795	24,890				28,288
Morgan Hill	107,619	92,760	22,215	225	222,819					
Mountain View	409,591	331,565	104,980		846,136	9,688	36,911	1,648		
Palo Alto	2,365,250	1,534,700	174,125	9,500	4,083,575	4,600	3,700	87,500		20,000
San Jose	14,604,495	9,335,740	2,240,645	220,335	25,801,215	642,140	150,050	346,720	3,160,805	105,834
Sunnyvale	387,685	286,465	138,265		812,415	9,215	830	3,625	11,360	
Santa Clara	841,140	1,015,735	83,940 313,876	13,550	2,288,241	2,350	1,650	40,458		58,616

SCHEDULE 28—Continued.

Summary of City Clerks' Reports for the Year 1916.

County and city	Nonoperative assessed values					Operative, assessed values				
	Land	Improvements	Personal property	Money and credits	Total assessed value, nonoperative roll	Land	Improvements	Personal property	Money and credits	Railroad property by State Board of Equalization
Santa Cruz—										
Santa Cruz	$4,241,890	$2,257,500	$567,365	$3,605	$7,070,360	$67,980	$149,230	$191,975	$98,285	$112,080
Watsonville	1,125,315	1,027,485	471,919	1,615	2,626,334	186,250	24,230	64,145	174,620	21,648
Shasta—										
Redding	528,850	748,730	219,885		1,497,465	8,600	38,580	102,962	104,248	49,922
Sierra—										
Loyalton	500	16,380	4,950		21,830	116,085	118,965	48,810		21,200
Siskiyou—										
Dorris	38,932	43,291	47,131		129,354	3,252	2,500		6,090	
Dunsmuir	141,065	280,000	70,047	13,269	504,381	1,250	14,895	53,700		
Etna	55,625	128,335	72,762		256,722					
Fort Jones	27,630	88,745	64,373	500	181,248					
Montague	125,956	85,140	45,992	20,000	275,088	6,651	50,630	15,000		
Sisson	148,839	144,415	58,366		351,620					
Yreka	137,723	380,475	147,417	3,850	669,465	2,100	7,850	36,130	65,500	
Solano—										
Benicia	260,270	393,450	120,890		774,610	1,965	9,800	19,020		40,800
Dixon	206,650	335,100	154,650		696,400	6,000		44,600		
Fairfield	142,995	198,255	48,350	3,482	393,082	3,860	1,900	19,366		
Rio Vista	108,792	294,765	169,111		572,668	8,875				
Suisun	141,445	238,740	96,510	450	477,145	900		42,864		
Vacaville	172,730	321,910	144,020		638,660	4,710	3,510	11,075		19,800
Vallejo	2,812,670	1,968,180	298,600		4,985,450	27,850		322,350		71,285
Sonoma—										
Cloverdale					577,364					
Healdsburg	312,105	561,003	238,339		1,111,447	1,000	400	21,175		17,426
Petaluma	2,464,790	1,888,950	1,102,690	108,170	5,564,600	15,085	31,355	177,740		16,010
Santa Rosa	2,899,675	2,587,090	843,005	18,115	6,347,885	22,320	167,360	60,320		21,727 17,718
Sebastopol	314,150	406,810	136,080		857,040	12,900	5,460	51,696		4,504
Sonoma	245,222	259,059	92,425		596,706	330	980	9,870		15,711

Stanislaus—										
Modesto	2,251,715	1,432,755	532,145	40,615	4,257,230	76,870	100,760	83,020	--------	39,855
Newman	165,000	216,530	138,515	--------	520,045	3,600	12,090	11,535	25,300	6,975
Oakdale	298,205	312,085	127,820	5,125	743,235	--------	--------	--------	--------	--------
Turlock	500,785	484,620	158,468	20,395	1,163,768	850	1,750	15,927	65,565	14,650
Sutter—										
Yuba City	261,448	315,260	78,645	--------	655,353	1,250	27,035	8,650 1,350	--------	37,193
Tehama—										
Corning	200,790	332,220	137,026	11,010	681,046	1,125	11,105	15,688	23,885	--------
Red Bluff	443,660	878,065	372,735	29,805	1,724,265	16,975	38,240	21,930	124,150	23,904
Tehama	35,475	43,955	38,265	1,300	118,965	1,245	9,205	470	--------	--------
Tulare—										
Dinuba	143,500	263,850	181,835	6,230	595,415	3,160	18,790	15,180	--------	20,400
Exeter	463,030	212,690	74,981	--------	750,701	36,470	29,550	63,407	--------	--------
Lindsay	515,216	481,200	122,607	39,450	1,163,763	2,850	9,800	30,009	--------	39,659
Porterville	1,242,486	844,235	298,296	--------	2,385,017	13,400	68,225	56,356	--------	--------
Tulare	878,419	758,913	210,693	9,325	1,857,401	625	5,000	103,981	--------	103,664
Visalia	1,468,330	1,485,220	468,905	2,000	3,424,455	46,495	122,870	15,432	--------	85,040
Tuolumne—										
Sonora	272,310	577,795	202,269	400	1,052,774	--------	--------	33,859	208,500	--------
Ventura—										
Fillmore	239,860	179,730	55,240	--------	474,830	900	1,600	5,180	16,000	36,300
Oxnard	1,007,263	792,845	575,204	--------	2,375,312	8,700	26,609	46,355	--------	38,080
San Buenaventura	859,410	551,670	403,710	3,000	1,801,650	4,650	8,950	94,000	--------	89,430
Santa Paula	577,223	631,350	237,432	--------	1,446,005	2,550	13,226	8,853	--------	64,680
Yolo—										
Winters	158,785	190,565	87,720	--------	437,070	1,750	1,750	16,740	9,125	19,800
Woodland	809,978	1,447,370	476,890	--------	2,734,238	25,450	91,929	9,634	--------	--------
Yuba—										
Marysville	1,198,090	1,629,910	765,142	--------	3,596,657	--------	--------	--------	--------	--------
Wheatland	62,556	128,800	54,950	--------	244,306	--------	--------	--------	--------	--------

SCHEDULE 28—Continued.

Summary of City Clerks' Reports for the Year 1916.

County and city	Total assessed value, operative roll	Grand total, operative and nonoperative	Tax rate	Total taxes levied
Alameda—				
Alameda	$1,536,904 00	$21,516,004 00	1.30	$256,089 30
Albany	180,717 00	3,351,617 00	.75	23,781 75
Berkeley	2,523,835 00	47,404,929 00	1.43	640,398 90
Emeryville		3,088,050 00	.50	15,440 25
Hayward	195,941 00	2,369,941 00	1.10	23,914 00
Livermore	110,411 00	1,042,606 00	1.75	16,313 40
Oakland	19,437,548 00	164,382,598 00	1.89	2,672,333 96
Piedmont	152,120 00	7,077,066 00	1.15	79,642 54
Pleasanton	52,006 00	535,306 00	.40	1,933 20
San Leandro	258,721 00	2,913,208 00	1.09	28,751 28
Alpine—				
Markleeville				
Amador—				
Jackson	39,785 00	669,786 00	.70	4,410 00
Sutter Creek		394,040 00	.75	2,955 30
Butte—				
Biggs		254,365 00	1.33	3,383 05
Chico	165,957 00	3,013,312 00	1.50 1.59	42,919 55
Gridley	30,430 00	504,020 00	1.00	4,735 90
Oroville	126,190 00	1,797,930 00	1.70	29,280 75
Calaveras—				
Angels	177,050 00	714,355 00	.35	1,880 56
Colusa—				
Colusa	35,665 00	1,257,884 00	1.25	15,323 02
Contra Costa—				
Antioch	51,855 00	877,470 00	1.50	12,470 31
Concord	21,037 00	396,294 00	1.70	6,379 37
Hercules		894,875 00	.70	6,264 00
Martinez	129,394 00	2,054,604 00	1.20	23,102 52
Pinole	49,653 00	221,928 00	1.25	2,153 43
Pittsburg	36,995 00	926,485 00	1.08	9,576 40
Richmond		17,326,285 00	1.20	207,915 42
Walnut Creek		223,610 00	1.00	2,236 10
Del Norte—				
Crescent City		403,050 00	.75	3,022 00
El Dorado—				
Placerville	75,146 00	880,676 00	1.20	9,666 36
Fresno—				
Clovis	65,140 00	522,205 00	1.76	8,000 00
Coalinga	82,732 00	1,160,921 00	1.36	14,663 37
Firebaugh		64,230 00		
Fowler	45,523 00	495,528 00	1.81	8,152 00
Fresno	2,253,655 00	24,831,867 00	1.30	390,253 64
Kingsburg	69,980 00	563,260 00	2.00	7,966 00
Reedley	144,025 00	913,485 00	1.35	10,387 71
Sanger	115,300 00	638,040 00	1.85	8,201 15
Selma	217,569 00	1,313,469 00	1.50	6,575 40
Glenn—				
Orland	37,286 00	605,978 00	2.00	11,368 59
Willows	76,000 00	1,676,857 00	1.44	22,355 60
Humboldt—				
Arcata	48,820 00	970,560 00	1.20	11,060 88
Blue Lake	6,296 00	113,616 00	1.00	1,073 20
Eureka	689,183 00	8,620,131 00	1.10	87,240 43
Ferndale	59,360 00	597,110 00	1.30	6,990 75
Fortuna		458,795 00	1.35	6,193 73
Imperial—				
Brawley	150,136 00	1,722,656 00	1.80	28,305 37
Calexico	66,545 00	2,361,810 00	1.00	22,952 65
El Centro	170,743 00	3,661,481 00	1.76	61,436 99
Holtville	95,000 00	827,860 00	2.40	17,406 60
Imperial	73,911 00	1,449,843 00	1.90	26,264 50
Inyo—				
Bishop	209,445 00	1,110,250 00	1.45	13,061 67

SCHEDULE 28—Continued.

Summary of City Clerks' Reports for the Year 1916.

County and city	Total assessed value, operative roll	Grand total, operative and nonoperative	Tax rate	Total taxes levied
Kern—				
Bakersfield	$1,710,445 00	$14,819,465 00	1.32	$169,159 95
Delano	8,660 00	226,423 00	1.00	2,084 77
Maricopa	207 00	585,768 00	.85	4,977 27
McKittrick	--------	120,600 00	1.00	1,206 00
Taft	--------	829,490 00	1.52	12,608 25
Tehachapi	--------	165,290 00	1.88	3,107 42
Kings—				
Corcoran	--------	--------	1.00	4,409 43
Hanford	420,421 00	5,458,921 00	1.28	64,827 45
Lemoore	79,321 00	639,544 00	1.50	8,403 35
Lake—				
Lakeport	12,435 00	578,240 00	1.09	6,066 46
Lassen—				
Susanville	22,599 00	481,826 00	1.50	6,888 40
Los Angeles—				
Alhambra	784,423 00	10,033,860 00	1.07	95,030 57
Arcadia	174,940 00	3,355,010 00	1.00	31,737 80
Avalon	9,700 00	941,717 00	1.00	9,320 17
Azusa	158,795 00	1,794,158 00	2.00	32,707 26
Beverly Hills	242,110 00	3,903,880 00	1.00	36,251 52
Burbank	399,197 00	2,729,067 00	1.00	23,454 01
Claremont	206,830 00	1,763,355 00	1.15	17,900 03
Compton	246,969 00	1,147,964 00	1.60	14,415 92
Covina	--------	--------	1.27	15,399 64
Eagle Rock	--------	2,106,503 00	1.00	20,425 03
El Monte	17,405 00	455,529 00	1.20	5,257 49
Glendale	221,569 00	5,176,199 00	1.15	57,571 76
Glendora	145,755 00	1,246,335 00	1.25	13,736 00
Hermosa Beach	176,097 00	2,519,287 00	1.40	32,804 66
Huntington Park	126,248 00	2,221,317 00	1.05	21,935 89
Inglewood	394,285 00	2,219,279 00	1.23	22,447 41
Long Beach	3,857,198 00	35,403,662 00	1.26	390,419 93
Lordsburg	126,510 00	872,235 00	1.48	11,036 73
Los Angeles	98,454,670 00	580,779,990 00	1.45	6,731,503 95
Manhattan Beach	127,232 00	2,189,352 00	1.84	37,013 62
Monrovia	335,382 00	4,475,087 00	1.30	53,816 16
Pasadena	3,468,349 00	61,224,529 00	1.03	587,370 29
Pomona	563,394 00	8,336,252 00	1.65	129,883 83
Redondo Beach	1,500,420 00	4,988,176 00	1.65	57,547 97
San Fernando	213,505 00	1,265,590 00	.90	9,468 76
San Gabriel	171,935 00	1,874,340 00	.85	14,470 44
San Marino	57,552 00	3,596,767 00	.57	20,000 00
Santa Monica	1,089,395 00	17,138,855 00	1.30	189,383 63
Sawtelle	--------	1,831,903 00	1.25	17,389 29
Sierra Madre	145,320 00	1,711,905 00	1.70	25,825 00
South Pasadena	872,503 00	7,155,348 00	1.45	91,099 00
Tropico	214,603 00	1,547,143 00	1.21	15,779 00
Venice	1,356,945 00	11,745,915 00	1.20	129,245 27
Vernon	--------	3,391,235 00	.75	25,434 00
Watts	351,835 00	1,499,245 00	1.22	14,470 60
Whittier	109,237 00	4,068,813 00	1.67	65,101 11
Madera—				
Madera	102,559 00	1,312,066 00	1.55	18,747 35
Marin—				
Belvedere	3,726 00	765,144 00	1.61	12,258 83
Larkspur	--------	673,440 00	1.50	10,101 60
Mill Valley	67,568 00	2,557,298 00	1.15	28,454 68
Ross	26,056 68	1,230,468 68	1.50	18,066 18
San Anselmo	76,917 65	1,828,047 65	1.78	29,492 86
San Rafael	212,002 00	5,230,840 00	1.35	67,754 32
Sausalito	354,922 00	3,273,822 00	1.64	35,271 73
Mendocino—				
Fort Bragg	--------	754,360 00	1.45	10,938 23
Point Arena	1,351 00	160,281 00	.50	794 65
Potter Valley	--------	501,985 00	.60	3,011 91
Ukiah	47,240 00	1,111,055 00	1.10	11,701 96
Willits	39,291 00	579,081 00	1.20	6,027 10

SCHEDULE 28—Continued.

Summary of City Clerks' Reports for the Year 1916.

County and city	Total assessed value, operative roll	Grand total, operative and nonoperative	Tax rate	Total taxes levied
Merced—				
Los Banos	$41,870 00	$686,630 00	1.30	$8,381 88
Merced	233,964 00	1,942,779 00	1.30	20,891 26
Modoc—				
Alturas			1.75	8,219 10
Monterey—				
King City	28,661 00	406,898 00	1.00	3,772 37
Monterey	170,972 00	2,842,541 00	1.52	40,607 84
Pacific Grove	90,935 00	2,476,575 00	1.17	27,911 98
Salinas	176,014 00	2,564,622 00	1.30	31,051 90
Napa—				
Calistoga		598,355 00	.90	5,385 19
Napa	234,607 00	4,945,362 00	1.16	54,598 60
St. Helena		1,353,255 00	.75	10,148 58
Nevada—				
Grass Valley	178,531 00	1,701,457 00	.90	13,707 05
Nevada City	40,441 00	901,438 00	1.00	8,609 97
Orange—				
Anaheim	209,845 00	2,373,890 00	1.45	31,378 65
Fullerton	143,608 00	4,422,313 00	1.50	64,180 57
Huntington Beach		2,463,025 00	1.55	37,744 74
Newport Beach	93,577 00	2,286,086 00	1.30	28,375 87
Orange	137,964 00	2,865,399 00	1.30	35,784 02
Santa Ana	806,917 00	7,593,377 00	1.40	95,010 43
Stanton	201,678 00	543,498 00	1.00	3,418 20
Placer—				
Auburn	69,800 00	1,424,353 00	1.00	13,545 53
Colfax		185,735 00	1.45	2,693 16
Lincoln	56,548 15	605,203 00	1.35	7,613 91
Rocklin	230,551 00	428,402 00	.75	1,483 88
Roseville	76,306 00	1,093,964 00	1.20	12,211 89
Riverside—				
Banning	91,922 00	647,662 00	1.15	6,391 01
Beaumont	72,020 00	360,030 00	1.23	3,542 00
Corona	186,630 00	4,535,715 00	1.32	56,935 08
Elsinore	126,156 00	517,669 00	1.81	736,392 00
Hemet	52,260 00	708,530 00	2.05	13,453 53
Perris		158,050 00	1.80	3,168 00
Riverside	1,525,997 00	11,231,867 00	1.58	148,752 17
San Jacinto	43,604 00	369,684 00	2.25	7,336 80
Sacramento—				
Sacramento	6,168,886 00	73,903,037 00	1.24	839,480 00
San Benito				
Hollister	398,470 00	1,816,910 00	1.35	18,953 17
San Juan	2,200 00	148,725 00	1.50	2,212 27
San Bernardino—				
Chino		1,215,750 00	1.70	20,667 75
Colton	591,252 00	1,964,527 00	.26	3,750 51
Needles	314,895 00	893,730 00	.80	4,730 68
Ontario	434,780 00	3,324,510 00	1.84	35,832 64
Redlands	690,600 00	9,565,160 00	1.30	115,356 18
Rialto	53,120 00	1,623,048 00	.60	9,378 35
San Bernardino	1,936,950 00	7,558,035 00	1.63	91,623 09
Upland	275,120 00	2,057,095 00	1.60	28,511 69
San Diego—				
Chula Vista	62,180 00	1,390,208 00	.95	12,619 76
Coronado	107,445 00	3,581,486 00	1.87	64,963 11
East San Diego		2,822,069 00	1.00	28,220 69
El Cajon		372,308 00	.90	4.111 81
Escondido		1,240,958 00	1.40	17,380 00
La Mesa		456,618 00	1.20	5,479 41
National City	483,329 00	2,951,464 00	1.12	27,643 65
Oceanside	114,619 00	766,122 00	2.03	13,224 90
San Diego	5,151,598 00	89,136,243 00	1.98	1,565,365 82
San Joaquin—				
Lodi	279,773 00	2,311,918 00	1.00	20,321 45
Stockton	1,875,687 00	29,018,450 00	1.60	557,812 50
Tracy		667,529 00	1.85	12,349 28

SCHEDULE 28—Continued.

Summary of City Clerks' Reports for the Year 1916.

County and city	Total assessed value, operative roll	Grand total, operative and nonoperative	Tax rate	Total taxes levied
San Luis Obispo—				
Arroyo Grande	$15,510 00	$386,738 00	.75	$2,784 21
El Paso de Robles	115,366 00	1,055,383 00	1.90	17,860 32
San Luis Obispo	588,113 00	3,884,491 00	2.22	73,179 58
San Mateo—				
Burlingame	57,268 00	3,081,193 00	1.42	42,939 74
Daly City	-----	1,554,840 00	1.62	25,101 84
Hillsborough	-----	3,803,730 00	1.35	51,350 19
Redwood City	175,355 00	2,492,065 00	1.50	34,070 36
San Bruno	93,024 00	1,446,679 00	.90	12,200 13
San Mateo	229,491 00	3,788,721 00	1.44	50,273 67
South San Francisco	-----	1,760,660 00	1.00	17,606 60
Santa Barbara—				
Lompoc	86,015 00	883,146 00	1.35	10,761 27
Santa Barbara	1,051,111 00	12,124,381 00	1.00	167,285 70
Santa Maria	-----	1,229,354 00	1.20	14,752 24
Santa Clara				
Alviso	64,710 00	290,630 00	.40	835 34
Gilroy	79,875 00	940,873 00	1.90	16,707 44
Los Gatos	102,074 00	1,957,589 00	1.65	30,616 07
Mayfield	53,178 00	597,973 00	2.09	11,833 07
Morgan Hill	-----	-----	1.25	2,797 50
Mountain View	48,247 00	894,383 00	1.50	13,005 65
Palo Alto	115,800 00	4,199,375 00	.95	39,385 81
San Jose	4,405,549 00	30,206,764 00	1.22	313,574 18
Sunnyvale	25,000 00	837,415 00	1.53	12,429 84
Santa Clara	103,074 00	2,391,315 00	1.49	34,566 37
Santa Cruz—				
Santa Cruz	619,550 00	7,689,910 00	1.80	124,046 37
Watsonville	303,268 00	2,929,602 00	1.10	28,889 65
Shasta—				
Redding	304,312 00	1,801,777 00	1.75	26,205 63
Sierra—				
Loyalton	305,060 00	326,890 00	1.75	4,967 55
Siskiyou—				
Dorris	11,842 00	141,196 00	1.25	1,634 72
Dunsmuir	69,845 00	574,226 00	1.28	6,456 08
Etna	-----	256,722 00	1.45	3,722 46
Fort Jones	-----	181,248 00	.25	453 12
Montague	72,281 00	365,069 00	1.60	4,404 20
Sisson	-----	351,620 00	.75	2,643 52
Yreka	111,580 00	781,045 00	1.60	10,711 44
Solano—				
Benicia	71,585 00	846,195 00	1.50	11,616 00
Dixon	50,600 00	747,000 00	1.50	10,446 00
Fairfield	25,126 00	418,208 00	2.20	8,647 80
Rio Vista	8,875 00	581,543 00	1.50	8,590 10
Suisun	43,764 00	520,909 00	1.58	7,882 58
Vacaville	39,095 00	677,755 00	1.65	10,537 89
Vallejo	421,485 00	5,406,935 00	2.00	99,706 08
Sonoma—				
Cloverdale	-----	-----	1.00	5,773 64
Healdsburg	40,001 00	1,151,448 00	1.35	15,144 52
Petaluma	240,190 00	5,804,790 00	1.05	58,156 56
Santa Rosa	289,445 00	6,637,330 00	1.35	85,940 07
Sebastopol	74,560 00	931,600 00	1.20	10,552 89
Sonoma	26,891 00	623,597 00	1.45	8.743 67
Stanislaus—				
Modesto	300,505 00	4,557,735 00	1.60	68,115 68
Newman	36,730 00	556,775 00	1.40	7,362 62
Oakdale	-----	743,235 00	1.75	13,006 62
Turlock	114,642 00	1,278,410 60	1.70	21,589 07
Sutter—				
Yuba City	75,478 00	730,831 00	1.30	9,598 15

SCHEDULE 28—Concluded.

Summary of City Clerks' Reports for the Year 1916.

County and city	Total assessed value, operative roll	Grand total, operative and nonoperative	Tax rate	Total taxes levied
Tehama—				
Corning	$51,803 00	$732,849 00	1.80	$12,258 83
Red Bluff	225,199 00	1,949,464 00	1.21	20,863 60
Tehama	10,920 00	129,885 00	1.25	1,487 06
Tulare—				
Dinuba	57,530 00	652,945 00	1.675	9,973 20
Exeter	129,427 00	880,128 00	1.80	13,512 61
Lindsay	82,318 00	1,246,081 00	2.00	25,027 42
Porterville	137,981 00	2,522,998 00	1.45	34,441 69
Tulare	213,270 00	2,070,671 00	1.45	26,932 31
Visalia	259,837 00	3,599,252 00	1.07	39,422 01
Tuolumne—				
Sonora	242,359 00	1,295,133 00	1.07	11,264 68
Ventura—				
Fillmore	59,980 00	534,810 00	1.00	4,921 70
Oxnard	119,744 00	2,495,656 00	1.24	29,453 87
San Buenaventura	197,030 00	1,998,680 00	1.80	32,429 70
Santa Paula	89,309 00	1,535,314 00	1.75	25,305 09
Yolo—				
Winters	49,165 00	486,235 00	1.60	7,211 65
Woodland	127,013 00	2,861,251 00	1.60	44,515 81
Yuba—				
Marysville	----------------	3,596,657 00	1.90	68,333 24
Wheatland	17,141 00	261,447 00	1.50	3,664 59

SCHEDULE 29.

Table Showing Per Capita Cost of County Governments.

County	Total county population 1915-16	Per capita nonoperating, total wealth 1916	Per capita cost, county tax levy 1916	Per capita special tax levy	Total per capita of general and special county taxes
Alameda	309,954	$1,546 20	$7 87	$3 94	$11 81
Alpine	198	8,673 97	44 48	-------------	44 48
Amador	9,836	1,593 96	11 66	1 83	13 49
Butte	29,450	1,908 03	22 10	2 47	24 57
Calaveras	8,518	2,252 79	17 16	79	17 95
Colusa	9,397	3,868 66	29 07	4 06	33 13
Contra Costa	50,487	2,542 67	16 98	4 03	21 01
Del Norte	2,733	4,812 28	40 94	1 65	41 99
El Dorado	7,254	2,523 82	18 83	32	19 15
Fresno	117,580	1,760 53	11 10	3 57	14 67
Glenn	11,114	2,257 83	27 36	13 21	40 57
Humboldt	37,008	4,078 00	18 75	1 54	20 29
Imperial	37,067	1,908 26	12 60	7 53	20 13
Inyo	9,858	2,083 80	12 38	1 31	13 69
Kern	67,242	3,650 03	14 95	3 43	18 38
Kings	22,850	1,776 13	16 36	4 10	20 46
Lake	5,646	2,279 42	17 93	1 37	19 30
Lassen	8,223	2,462 64	16 75	2 19	18 94
Los Angeles	771,247	2,177 94	9 00	8 12	17 12
Madera	14,968	2,209 14	16 77	2 94	19 71
Marin	29,663	1,741 51	11 13	4 36	15 49
Mariposa	3,975	2,261 84	15 76	16	15 92
Mendocino	29,371	1,604 24	12 41	87	13 28
Merced	23,458	2,576 67	18 88	4 53	23 41
Modoc	7,428	2,778 55	18 55	2 03	20 58
Mono	2,091	2,603 71	16 36	-------------	16 36
Monterey	28,793	2,762 68	20 15	2 39	22 54
Napa	19,626	1,962 87	14 48	3 44	17 92
Nevada	14,137	925 60	11 95	58	12 53
Orange	52,236	3,335 09	16 81	8 16	24 97
Placer	22,954	1,620 27	10 23	2 03	12 26
Plumas	6,681	2,871 71	20 68	2 30	22 98
Riverside	45,763	2,232 45	13 75	6 53	20 28
Sacramento	91,184	1,705 52	13 59	5 25	18 84
San Benito	8,790	2,684 38	22 49	51	23 00
San Bernardino	76,488	1,718 28	10 73	2 90	13 63
San Diego	99,571	1,989 98	-------------	5 24	5 24
San Francisco	514,560	2,189 64	23 66	-------------	23 66
San Joaquin	73,591	1,945 03	13 77	3 38	17 15
San Luis Obispo	20,771	3,679 12	18 95	2 13	21 08
San Mateo	28,038	2,621 55	-------------	21 38	21 38
Santa Barbara	33,942	2,229 56	17 27	5 49	22 76
Santa Clara	97,873	1,692 46	11 80	2 06	13 86
Santa Cruz	27,508	1,713 48	13 43	2 84	16 27
Shasta	19,601	1,904 70	17 09	68	17 77
Sierra	3,115	1,920 96	16 29	99	17 28
Siskiyou	24,214	1,753 73	13 20	2 47	15 67
Solano	30,884	1,295 12	13 96	3 70	17 66
Sonoma	58,505	1,854 48	11 96	3 22	15 18
Stanislaus	39,153	1,646 75	14 32	4 70	19 02
Sutter	7,907	2,549 36	30 89	4 53	35 42
Tehama	13,980	1,956 98	29 40	2 38	31 78
Trinity	3,788	2,253 19	20 99	03	21 02
Tulare	50,644	2,696 42	19 38	3 85	23 23
Tuolumne	10,077	2,042 74	16 58	3 26	19 84
Ventura	25,963	2,761 85	22 92	3 93	26 85
Yolo	15,898	2,714 47	24 71	3 69	28 40
Yuba	14,023	1,475 99	17 71	1 85	19 56
Totals	3,216,838	$2,121 09			

*Based on average daily school attendance

SCHEDULE 30.

Table Showing Per Capita Cost of Municipal Governments.

County and city	Population 1915-1916	Tax levy 1915	Per capita cost
Alameda—			
Alameda	26,609	$331,049 00	$12 44
Albany	2,272	23,146 87	10 18
Berkeley	49,450	578,801 40	11 68
Emeryville	3,686	18,503 95	5 02
Hayward	3,188	22,660 75	7 10
Livermore	1,270	16,092 10	12 67
Oakland	197,628	2,591,702 00	13 11
Piedmont	4,319	76,102 27	17 62
Pleasanton	1,591	1,720 77	1 08
San Leandro	5,463	29,403 29	5 38
Alpine—			
Amador—			
Jackson	2,328	4,345 95	1 86
Sutter Creek	1,300	2,192 77	1 68
Butte—			
Biggs	498	3,050 00	6 12
Chico	4,503	41,821 39	9 28
Gridley	1,359	4,176 30	3 07
Oroville	4,225	30,655 97	7 25
Calaveras—			
Angels	2,500	2,030 33	81
Colusa—			
Colusa	1,917	16,074 53	8 38
Contra Costa—			
Antioch	1,383	10,991 73	7 94
Concord	969	7,060 95	7 28
Hercules	460	5,754 17	12 50
Martinez	3,692	15,392 70	4 16
Pinole	1,316	2,153 44	1 63
Pittsburg	4,000	8,555 90	2 13
Richmond	17,732	182,428 12	10 28
Walnut Creek	600	4,054 70	------------
Del Norte—			
Crescent City	1,287	3,001 55	2 33
El Dorado—			
Placerville	2,011	9,075 28	4 51
Fresno—			
Clovis	1,500	6,860 55	4 57
Coalinga	5,740	14,772 61	2 57
Firebaugh	600	------------	------------
Fowler	903	8,591 90	9 51
Fresno	39,827	357,726 51	9 03
Kingsburg	798	8,170 00	10 23
Reedley	2,200	9,935 19	4 51
Sanger	2,600	7,737 80	2 97
Selma	2,401	15,404 30	6 41
Glenn—			
Orland	1,656	10,085 80	6 09
Willows	1,775	22,450 17	12 64
Humboldt—			
Arcata	1,200	9,225 90	7 68
Blue Lake	408	1,055 70	2 58
Eureka	13,467	87,670 50	6 51
Ferndale	811	7,196 45	8 87
Fortuna	910	5,653 00	6 21
Imperial—			
Brawley	2,243	27,232 19	12 14
Calexico	2,477	34,521 73	13 93
El Centro	5,427	72,195 25	13 30
Holtville	1,321	16,245 40	12 29
Imperial	1,982	26,084 75	13 16
Inyo—			
Bishop	1,641	12,397 32	7 55

SCHEDULE 30—Continued.

Table Showing Per Capita Cost of Municipal Governments.

County and city	Population 1915-1916	Tax levy 1915	Per capita cost
Kern—			
Bakersfield	28,813	$203,300 44	$7 05
Delano	575	----------	----------
Maricopa	1,750	5,271 72	3 01
McKittrick	500	854 10	1 70
Taft	3,500	12,949 26	3 69
Tehachapi	374	2,836 64	7 58
Kings—			
Corcoran	700	3,472 00	3 85
Hanford	6,306	55,575 00	8 81
Lemoore	1,549	7,586 47	4 89
Lake—			
Lakeport	974	5,610 18	5 75
Lassen—			
Susanville	845	6,075 06	7 18
Los Angeles—			
Alhambra	9,183	102,500 00	11 16
Arcadia	1,687	28,532 40	16 91
Avalon	750	3,693 53	4 92
Azusa	1,999	17,819 55	8 91
Beverly Hills	590	23,206 60	39 33
Burbank	2,000	8,693 57	4 34
Claremont	1,218	15,051 53	11 35
Compton	997	11,616 48	11 65
Covina	2,304	12,152 79	5 27
Eagle Rock	1,800	16,214 35	9 00
El Monte	1,200	5,188 56	4 32
Glendale	8,894	57,515 75	6 46
Glendora	2,200	11,588 75	5 26
Hermosa Beach	1,566	32,991 58	21 06
Huntington Park	4,743	24,550 22	5 17
Inglewood	2,279	22,119 42	9 70
Long Beach	30,880	388,601 49	12 58
Lordsburg	1,609	11,400 67	7 08
Los Angeles	493,799	6,993,449 57	14 16
Manhattan Beach	1,500	27,515 67	18 34
Monrovia	4,902	55,956 04	11 41
Pasadena	40,074	605,293 82	15 10
Pomona	12,891	129,776 46	10 06
Redondo Beach	4,276	55,186 89	12 90
San Fernando	2,400	8,957 85	3 73
San Gabriel	1,700	15,172 33	8 92
San Marino	550	22,466 96	40 84
Santa Monica	12,068	293,598 62	24 32
Sawtelle	3,842	16,842 01	4 38
Sierra Madre	1,976	26,561 99	13 44
South Pasadena	7,010	91,541 02	12 89
Tropico	3,000	13,831 87	4 61
Venice	8,500	133,435 15	15 69
Vernon	1,252	22,704 80	18 13
Watts	4,197	12,587 96	2 99
Whittier	6,097	66,301 39	10 87
Madera—			
Madera	3,288	15,223 63	4 62
Marin—			
Belvedere	481	12,933 60	2 68
Larkspur	677	9,596 31	14 17
Mill Valley	2,933	28,454 68	9 70
Ross	735	18,018 80	2 45
San Anselmo	1,997	28,419 00	14 23
San Rafael	6,563	67,273 85	10 25
Sausalito	3,040	33,670 91	11 07
Mariposa—			
Mendocino—			
Fort Bragg	3,638	11,168 00	3 06
Point Arena	555	800 95	1 44
Potter Valley	959	3,008 00	3 13
Ukiah	2,206	9,497 34	4 50
Willits	1,715	6,077 58	3 54

SCHEDULE 30—Continued.

Table Showing Per Capita Cost of Municipal Governments.

County and city	Population 1915-1916	Tax levy 1915	Per capita cost
Merced—			
Los Banos	950	$7,879 06	$8 29
Merced	4,854	24,942 03	5 13
Modoc—			
Alturas	1,182	7,783 31	6 58
Mono—			
Monterey—			
King City	----------------	----------------	----------------
Monterey	8,049	40,978 30	5 09
Pacific Grove	2,913	27,491 45	9 43
Salinas	4,083	30,867 77	7 59
Napa—			
Calistoga	828	5,069 22	6 12
Napa	5,918	52,077 04	8 79
St. Helena	1,603	11,464 33	7 15
Nevada—			
Grass Valley	4,741	13,198 49	2 78
Nevada City	2,920	8,373 11	2 86
Orange—			
Anaheim	3,623	33,556 24	9 26
Fullerton	3,115	57,928 80	18 59
Huntington Beach	1,773	30,320 46	17 10
Newport Beach	660	22,724 14	34 43
Orange	4,224	35,171 63	8 32
Santa Ana	11,429	94,476 65	8 26
Stanton	575	3,495 10	6 07
Placer—			
Auburn	2,575	12,570 38	4 88
Colfax	625	2,611 80	4 17
Lincoln	1,999	7,631 74	3 81
Rocklin	1,173	1,516 44	1 29
Roseville	5,145	17,799 13	3 45
Plumas—			
Riverside—			
Banning	1,500	5,437 40	3 62
Beaumont	750	3,571 48	4 76
Corona	5,203	55,432 97	10 65
Elsinore	760	7,640 79	10 05
Hemet	1,311	12,486 71	9 52
Perris	900	3,500 00	3 88
Riverside	17,341	152,220 48	8 77
San Jacinto	1,228	7,336 80	5 97
Sacramento—			
Sacramento	69,904	844,010 59	12 07
San Benito—			
Hollister	2,391	16,852 49	7 04
San Juan	345	2,195 39	6 07
San Bernardino—			
Chino	2,375	41,821 39	6 36
Colton	5,926	19,077 25	3 21
Needles	3,500	3,253 53	92
Ontario	6,774	50,943 52	7 62
Redlands	10,198	114,950 00	11 27
Rialto	1,300	7,880 34	6 06
San Bernardino	18,286	89,989 60	4 92
Upland	2,677	30,970 43	11 56
San Diego—			
Chula Vista	2,000	11,982 00	5 99
Coronado	2,590	67,171 76	25 93
East San Diego	4,500	27,501 75	6 11
El Cajon	600	5,104 67	8 50
Escondido	1,520	16,838 08	11 07
La Mesa	1,400	5,459 56	3 89
National City	3,126	27,537 16	8 80
Oceanside	1,100	16,248 82	14 77
San Diego	64,630	1,448,678 90	22 41

SCHEDULE 30—Continued.

Table Showing Per Capita Cost of Municipal Governments.

County and city	Population 1915-1916	Tax levy 1915	Per capita cost
San Francisco—			
San Francisco	514,469	$12,174,704 75	$23 66
San Joaquin—			
Lodi	3,635	26,448 00	7 27
Stockton	42,552	434,356 14	10 20
Tracy	2,500	8,281 27	3 31
San Luis Obispo—			
Arroyo Grande	1,200	2,797 54	2 33
El Paso Robles	2,139	11,445 08	5 35
San Luis Obispo	5,420	65,345 55	12 05
San Mateo—			
Burlingame	3,750	42,410 11	11 30
Daly City	5,000	23,039 55	4 60
Hillsborough	900	53,342 15	59 26
Redwood City	3,118	32,748 56	10 50
San Bruno	1,500	5,291 60	3 52
San Mateo	4,831	53,518 00	11 07
South San Francisco	3,548	16,958 00	4 77
Santa Barbara—			
Lompoc	2,070	8,248 03	3 98
Santa Barbara	14,177	162,464 53	11 45
Santa Maria	2,528	15,450 20	6 11
Santa Clara—			
Alviso	717	901 18	1 25
Gilroy	2,541	15,911 16	6 26
Los Gatos	2,557	26,547 84	10 38
Mayfield	1,636	9,576 94	5 85
Morgan Hill	565	3,070 20	5 43
Mountain View	1,440	14,081 28	9 77
Palo Alto	5,598	38,979 84	6 96
San Jose	35,516	309,301 66	8 70
Sunnyvale	1,650	12,861 37	7 79
Santa Clara	5,621	33,593 27	5 97
Santa Cruz—			
Santa Cruz	11,591	118,839 67	10 25
Watsonville	4,614	30,000 56	6 50
Shasta—			
Kennett	----------	----------	----------
Redding	3,039	25,093 04	8 25
Sierra—			
Loyalton	715	3,337 27	4 66
Siskiyou—			
Dorris	349	1,634 72	4 68
Dunsmuir	2,284	6,896 11	3 06
Etna	472	4,036 17	8 55
Fort Jones	343	487 97	1 41
Montague	294	4,288 08	14 58
Sisson	500	2,890 10	5 78
Yreka	1,648	9,984 90	6 05
Solano—			
Benicia	2,289	11,616 00	5 07
Dixon	923	10,156 90	11 00
Fairfield	930	4,964 38	5 33
Rio Vista	1,522	7,742 28	5 08
Suisun	668	8,475 89	12 68
Vacaville	1,377	10,248 56	7 44
Vallejo	12,961	75,104 24	5 79
Sonoma—			
Cloverdale	834	5,498 01	6 59
Healdsburg	2,584	15,878 14	6 14
Petaluma	6,321	57,126 33	9 03
Santa Rosa	9,403	89,200 28	9 48
Sebastopol	1,794	9,458 00	5 27
Sonoma	1,148	8,843 63	7 70

SCHEDULE 30—Concluded.

Table Showing Per Capita Cost of Municipal Governments.

County and city	Population 1915-1916	Tax levy 1915	Per capita cost
Stanislaus—			
Modesto	7,039	$68,726 40	$9 76
Newman	1,140	7,285 75	6 39
Oakdale	1,280	11,097 30	8 66
Turlock	2,754	21,005 37	7 62
Sutter—			
Yuba City	1,236	7,018 57	5 67
Tehama—			
Corning	1,207	11,362 48	9 41
Red Bluff	3,593	20,573 87	5 72
Tehama	227	1,324 90	5 83
Trinity—			
Tulare—			
Dinuba	1,789	8,814 58	4 92
Exeter	2,000	13,695 90	6 84
Lindsay	2,652	24,017 30	9 05
Porterville	4,483	33,896 33	7 56
Tulare	3,301	25,159 77	7 62
Visalia	5,951	71,663 28	12 04
Tuolumne—			
Sonora	2,122	10,597 42	4 99
Ventura—			
Fillmore	1,700	4,921 70	2 89
Oxnard	4,376	29,683 89	6 78
San Buenaventura	3,587	30,950 36	8 62
Santa Paula	3,390	25,058 46	7 39
Yolo—			
Winters	968	7,485 65	7 73
Woodland	3,381	34,430 23	10 18
Yuba—			
Marysville	9,040	65,439 82	7 23
Wheatland	589	3,830 85	6 50

SCHEDULE 31.

Registration and Assessment of Automobiles in California for Year 1916.

County	Number registered	Number assessed	Average assessed value	Total assessed value
Alameda	10,535	6,400	$320	$2,050,000
Alpine	11	15	155	2,325
Amador	221	239	307	72,225
Butte	1,209	1,033	300	309,900
Calaveras	197	100	400	40,000
Colusa	452	452	250	112,805
Contra Costa	1,128	980	350	343,000
Del Norte	79	90	200	18,000
El Dorado	181	200	400	80,000
Fresno	5,887	5,260	250	1,315,320
Glenn	527	380	178	67,563
Humboldt	1,072	1,050	250	262,625
Imperial	1,728	1,646	250	411,500
Inyo	191	208	282	58,735
Kern	3,284	2,250	180	405,000
Kings	1,099	825	196	161,900
Lake	184	241	265	63,710
Lassen	44	230	276	63,569
Los Angeles	50,024	40,962	263	10,785,105
Madera	423	361	195	70,265
Marin	630	820	400	328,000
Mariposa	73	208	420	87,360
Mendocino	523	458	256	117,248
Merced	818	729	175	127,575
Modoc	42	207	230	46,500
Mono	14	24	287	6,800
Monterey	1,077	980	400	392,000
Napa	770	724	400	289,600
Nevada	240	280	350	98,000
Orange	4,689	4,245	381	1,618,000
Placer	483	550	300	16,500
Plumas	11	102	285	29,125
Riverside	2,719	2,173	213	461,798
Sacramento	4,107	4,008	275	1,102,200
San Benito	420	440	310	136,270
San Bernardino	4,276	3,662	157	573,460
San Diego	6,118	9,171	302	277,370
San Francisco	15,727	11,510	306	3,518,400
San Joaquin	3,557	3,104	259	802,836
San Luis Obispo	958	690	200	138,000
San Mateo	2,256	1,139	326	371,325
Santa Barbara	2,541	2,390	420	1,003,800
Santa Clara	5,066	3,021	305	920,875
Santa Cruz	1,079	847	217	183,905
Shasta	299	224	226	50,655
Sierra	9	57	400	22,400
Siskiyou	302	359	303	108,805
Solano	890	780	384	299,125
Sonoma	2,392	2,243	300	672,900
Stanislaus	2,380	2,254	188	425,560
Sutter	369	344	271	93,085
Tehama	467	480	400	191,615
Trinity	2	49	242	11,850
Tulare	2,044	2,310	380	877,800
Tuolumne	317	262	310	81,335
Ventura	1,744	1,622	260	421,700
Yolo	975	1,263	200	252,600
Yuba	389	400	250	100,000
Totals	149,249	127,051	$259	$32,949,924

SCHEDULE 32.

Table Showing Report of Land Holdings (2,000 Acres or more), October 1, 1916.

County	Number of owners	Total acreage tillable	owners	Aggregate acreage agricultural, grazing, timber, etc.
Colusa	32	205,320		
Contra Costa	15	147,780		
Fresno	11	216,964	11	406,243
Glenn			35	231,016
Humboldt	1	2,500	17	74,118
Imperial	4	52,938		
Kern			4	1,475,000
Lassen	13	44,255	23	140,189
Madera	41	423,034	53	485,111
Mariposa	4	9,500	4	61,000
Mendocino	1	2,000	1	8,466
Merced	46	118,914	70	766,977
Modoc	18	70,365	18	104,946
Monterey			48	483,500
Napa	7	19,300	11	42,366
Orange	9	199,442		
Riverside	8	462,623		
Sacramento	16	112,332		
San Benito	8	16,400	9	108,714
San Mateo			14	90,625
Santa Clara	4	17,975	26	257,314
Santa Cruz			9	59,149
Shasta			38	917,988
Sierra	6	11,300	10	36,129
Stanislaus	21	105,313		
Sutter	3	12,230	3	32,345
Ventura	5	17,504	5	54,963
Yolo	19	71,326		
Sonoma			24	132,397
San Diego	15	21,661	15	326,912
Thirty counties	307	2,360,976	448	6,295,468

SCHEDULE 33.

Table Showing Vote in California on Single Tax Measures for Years 1912, 1914, 1916.

Counties	"Home Rule in Taxation"				Single Tax, 1916	
	1912		1914			
	Yes	No	Yes	No	Yes	No
Alameda	19,452	29,015	29,226	36,707	30,262	55,472
Alpine	11	43	9	24	11	45
Amador	340	978	479	1,547	592	1,644
Butte	1,489	3,214	2,688	5,213	2,431	4,855
Calaveras	316	1,193	569	1,264	539	1,704
Colusa	306	1,041	632	1,751	504	1,883
Contra Costa	1,919	2,805	4,036	4,949	4,507	6,440
Del Norte	126	235	206	286	296	463
El Dorado	418	1,086	574	1,366	549	1,751
Fresno	4,192	7,218	7,045	11,064	7,768	14,638
Glenn	322	1,012	655	2,025	611	1,913
Humboldt	1,700	3,138	2,957	4,408	3,585	5,464
Imperial	*865	818	*2,275	1,915	1,262	4,005
Inyo	353	552	587	976	449	1,289
Kern	*2,461	2,275	*4,722	4,518	5,394	6,669
Kings	871	1,622	1,032	2,925	1,174	3,268
Lake	497	745	590	1,204	525	1,154
Lassen	239	612	491	987	426	1,559
Los Angeles	41,081	60,501	*77,888	73,297	63,606	174,788
Madera	449	676	1,283	1,110	991	1,534
Marin	2,078	2,129	2,430	3,856	2,708	4,294
Mariposa	199	313	281	507	348	677
Mendocino	833	1,984	1,454	4,110	1,618	4,179
Merced	913	1,491	1,303	2,490	1,401	2,688
Modoc	258	729	382	1,095	328	1,217
Mono	65	94	93	126	104	113
Monterey	1,231	2,666	1,976	3,453	1,757	4,763
Napa	1,009	2,099	1,329	3,807	1,306	4,520
Nevada	697	1,526	1,121	2,049	906	2,351
Orange	1,879	5,161	4,625	7,302	2,410	14,130
Placer	843	1,655	1,614	2,745	1,279	3,474
Plumas	363	511	433	759	468	798
Riverside	1,638	4,431	4,184	5,319	2,548	9,070
Sacramento	4,595	6,573	7,621	11,248	6,411	13,947
San Benito	264	1,030	419	1,672	513	2,141
San Bernardino	2,675	6,200	6,315	9,021	3,667	16,146
San Diego	*7,387	6,470	*12,488	10,676	11,615	18,374
San Francisco	*38,168	28,218	35,583	63,864	51,439	73.801
San Joaquin	3,122	4,571	5,724	8,896	5,718	11,325
San Luis Obispo	1,066	1,841	1,664	2,875	2,265	3,468
San Mateo	2,091	2,103	2,640	4,107	3,815	4,429
Santa Barbara	1,281	2,867	2,873	3,275	2,158	6,534
Santa Clara	4,720	9,900	7,843	13,547	5,694	23,023
Santa Cruz	1,390	3,035	2,478	3,993	2,338	5,267
Shasta	828	1,817	1,523	2,488	1,467	2,586
Sierra	178	409	209	457	208	475
Siskiyou	847	1,739	1,388	2,687	1,451	3,118
Solano	1,829	2,888	2,561	4,444	2,612	5,266
Sonoma	2,849	5,185	4,171	9,946	4,417	11,468
Stanislaus	1,552	2,983	3,546	5,199	2,790	5,916
Sutter	287	832	408	2,036	397	1,949
Tehama	471	1,595	1,177	2,561	1,223	2,425
Trinity	175	326	262	664	277	623
Tulare	1,915	4,159	3,563	7,369	3,692	9,272
Tuolumne	345	1,011	667	1,681	611	1,687
Ventura	828	1,843	1,751	2,442	1,182	4,884
Yolo	572	1,892	939	3,091	928	3,562
Yuba	473	903	636	2,271	783	2,033
Totals	169,321	243,959	267,618	375,634	260,332	576,533
Defeated by	74,638		108,016		316 201	
Total vote cast on measure	413,280		643,252		836,865	

*Show counties in which measure was approved in 1912 and 1914.

SCHEDULE 34.

Table Showing Reported Timber Land Acreage and Values.

Description	Acreage	Total cruise	Total appraised value	Appraised value per M	Assessed value
Butte County—					
Twps. 20 and 21 N., R. 6 and 7 E.	10,723.56	281,891,000	$563,782	$2 00	$103,290
Twps. 20 and 21 N., R. 6 and 7 E.	6,049.70	58,729,000	88,093	1 50	35,585
Twps. 24 and 25 N., R. 3 E., M.D.M.	10,040.00	99,517,000	129,372	1 30	22,775
Glenn and Lake counties—					
Twps. 20, 21 and 22 N., R. 7, 8 and 9 W., M.D.M. Although the bulk of the tract lies in Glenn County, there are 768 acres over the line into eastern Lake County	19,764.39	420,512,000	841,024	2 00	123,404
Humboldt County—					
Located on coast slope of Mendocino County, 18 miles north of Fort Bragg	4,237.50	76,502,000	133,878	1 75	42,375
Two separate tracts—1. 4,351.67 acres in T. 3 and 4 N., 1. E., H. M. 2. 1,260 acres in T. 11 and 12 N., R. 1 E., H. M.	5,611.67	622,521	2,490,084	4 00	248,855
Property scattered	1,771.00	131,492,000	197,240	1 50	61,985
San Mateo and Santa Cruz counties—					
Mainly in southern portion of San Mateo County, although a few subdivisions lie across the county line in the northern part of Santa Cruz County	11,517.00	777,696,000	1,555,392	2 00	115,517
Mendocino County—					
Holdings lie on Usal and Hardy creeks	13,200.00	500,000,000	1,000,000	2 00	132,000
Sonoma County—					
Twp. 10 N., R. 13 W.,	1,340.00	61,918,000	92,877	1 50	12,650
Siskiyou County—					
Twp. 39 N., R. 3 W., M.D.M.	11,520.00	270,065,000	540,130	2 00	92,160
Twps. 47 and 48 N., R. 7, 8, 9, 10 and 11 W., M.D.M.	21,971.26	542,128,000	677,660	1 25	175,768
Tulare County—					
Twps. 19 and 20 S., R. 30 and 31 E.	4,530.00	212,671,000	478,510	2 25	67,330

APPRAISERS.

ALAMEDA
  Breed, H. L.
  Richardson, Geo. H.
BUTTE
  Morse, Geo. P.
COLUSA
  Mogk, John C.
CONTRA COSTA
  Bacon, Chas. G.
FRESNO
  Aynesworth, G. L.
  Dearing, Milton M.
GLENN
  Graves, John H.
HUMBOLDT
  Barnum, F. B.
IMPERIAL
  Nuffer, A. P.
KERN
  Sears, W. L.
LOS ANGELES
  Benedict, H. Stanley
  Merrill, Leonard
MADERA
  McCardle, E. M.
MARIN
  Byrnes, Chas. W.
MENDOCINO
  Hurley, Judge Jas. C.
  Mannon, Chas. M.
NAPA
  Hayman, L. T.
  Newcomb, C. I.
NEVADA
  Barker, C. Herbert
ORANGE
  Anderson, John N.
PLACER
  Nelson, Thure N.
RIVERSIDE
  Flaherty, T. F.
SACRAMENTO
  Sullivan, J. E.
SAN BERNARDINO
  Allen, Halsey W.
  Bishop, J. W.
SAN DIEGO
  O'Hallaran, Thos.
SAN FRANCISCO
  Cosgriff, Harry H.
  Thorne, Julian
SAN JOAQUIN
  Bonney, T. P.
  Wilson, John A.
SAN LUIS OBISPO
  Vollmer, Ernest
SAN MATEO
  Chilcott, R. F.
SANTA BARBARA
  Kramer, Ira E.
SANTA CLARA
  Bohnett, W. C.
SANTA CRUZ
  Hammer, C. W.
SISKIYOU
  Smith, Clarence S.
SOLANO
  Barnett, S. R.
SONOMA
  Cromwell, F. A.
  Green, Lyman
STANISLAUS
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SUTTER
  Green, D. D.
TEHAMA
  Sisson, Elmer L.
TULARE
  Switzer, U. D.
VENTURA
  Gabbert, T. G.
YOLO
  Hare, Jas. L.
YUBA
  Delay, Peter J.
  Ebert, J. E.

FIRST REPORT

OF

Purchasing Department

OF

STATE OF CALIFORNIA

November 1, 1916

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO
1916

27771

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LETTER OF TRANSMITTAL.

To the Honorable HIRAM W. JOHNSON,
Governor of the State of California,
State Capitol,
Sacramento, California.

DEAR SIR: I have the honor to submit herewith my report of the organization and work of the State Purchasing Department, covering the first year of its existence. The following is the act creating the department:

Assembly Bill No. 989. Chapter 351.

An act to create a State Purchasing Department, to define the authority, powers, and duties thereof; to provide for the appointment of and to define the authority, powers, and duties and to fix the compensation of the officers and employees thereof, and to appropriate money for the support of said department; and to repeal all acts or parts of acts in conflict with the provisions of this act.

[Approved May 18, 1915.]

The people of the state of California do enact as follows:

SECTION 1. There is hereby created, of and for the state of California, a department to be known as the State Purchasing Department. Said department shall be in charge of a state officer to be known as the State Purchasing Agent. He shall be appointed by the Governor and shall hold office at the pleasure of the Governor. He shall be a civil executive officer. He shall execute to the people of the state a bond in the penal sum of ten thousand dollars for the faithful discharge of the duties of his office. He shall receive a salary of four thousand dollars per annum.

SEC. 2. The State Purchasing Agent shall, under the restrictions of this act, have full and sole power and authority and it shall be his duty upon approval of the State Board of Control to contract for and purchase or direct and supervise the purchase of all supplies of whatever nature necessary for the proper transaction of the business of each and every state department, commission, board, institution, or official. For the purpose of making such purchases and contracts the State Purchasing Agent shall be and is hereby made the purchasing agent of and for each and every state department, commission, board, institution and official. All appropriations or funds of the State University or funds that are now or may hereafter be exempted from the provisions of section six hundred seventy-two of the Political Code shall be exempt from the operation of this act, and where the best interests of the state demand, any purchase or contract against any other appropriation or fund may be exempted from the jurisdiction of the State Purchasing Department by the unanimous vote of the State Board of Control.

SEC. 3. The State Purchasing Agent shall have the power and authority, subject to the approval of the State Board of Control, to maintain warehouses, and to rent or lease, or construct the same, and to issue such rules and regulations as may be necessary for the proper and economical conduct of the business of the State Purchasing Department.

SEC. 4. An estimate or requisition approved by the department, commission, board or state official in control of the appropriation or fund against which such contract and purchase is to be charged, shall be full authority for any contract and any purchase made by the State Purchasing Agent, provided such contract and such purchase shall have first met the approval of the State Board of Control before being made.

SEC. 5. All valid claims on account of such contracts and purchases negotiated by the State Purchasing Agent shall be audited and paid from the sums severally set aside for the use of the State Purchasing Department by the contract and purchase estimate or requisition upon the sworn statement of the executive officer of the department, commission, board, or institution, or the state official in control of the appropriation or fund, together with the sworn statement of the State Purchasing Department, and said sworn statements of said executive officer and State Purchasing Department, after approval by the State Board of Control, shall be full and sufficient authority for the controller to draw his warrant and the treasurer to pay the same against any appropriation or fund in the treasury available for the purpose of any such contract and purchase.

SEC. 6. The State Purchasing Agent shall have the power to appoint one assistant State Purchasing Agent at an annual salary of three thousand dollars who shall be a civil executive officer, and one State Testing Engineer at an annual salary of twenty-seven hundred dollars. The State Purchasing Agent also shall have the power with the approval of the State Board of Control to appoint and fix the compensation of such additional employees as the proper and economical conduct of the business of the State Purchasing Department may demand.

The Assistant State Purchasing Agent shall execute to the people of the state a bond in the penal sum of five thousand dollars. He shall in case of absence from the state, or of death, or of disqualification of the State Purchasing Agent, become Acting State Purchasing Agent with all the duties and power of State Purchasing Agent as provided in this act, and in such case shall hold office at the pleasure of the Governor who shall have the power to appoint his successor.

SEC. 7. The State Purchasing Department shall maintain a testing laboratory and the State Testing Engineer shall be the custodian thereof, and of all the apparatus therein and pertaining thereto, and of all the testing apparatus and machinery which shall be in the possession of any state department, commission, board, institution, or official, and for which through the operation of this act they shall have no use. The State Testing Engineer shall perform such tests as may be required by any state department, commission, board, institution, or official, and for any tests made by the State Testing Engineer and not made on account of any purchase, lease, rental, or contract under the jurisdiction of the State Purchasing Agent, a charge may be made based upon the actual cost of material and labor employed, plus five per centum for use of apparatus and machinery, which shall be paid into the maintenance fund of the State Purchasing Department.

Sec. 8. The sum of fifty thousand dollars is hereby appropriated out of any money in the state treasury not otherwise appropriated to support the State Purchasing Department for the sixty-seventh and sixty-eighth fiscal years.

Sec. 9. All acts or parts of acts in conflict with the provisions of this act are hereby repealed.

REPORT.

Beginning with the appointment of the State Purchasing Agent on September 17, 1915, the first few months were given to the study of methods and forms necessary for the operation of the department. In the course of this investigation, purchasing departments of many of the great business corporations were visited and their methods studied, it being the desire to organize this large and important department along the most efficient lines.

This preliminary work having been accomplished with some degree of satisfaction, and the necessary forms and outline of operation having been formulated, on October 15, 1915, the department took over the purchasing for the state offices and commissions, sixty-five departments in all. It was deemed best to take over the various state departments gradually, in order to accustom them to the new routine of business and that we might avoid congestion and consequent interruption and delay in the state's business. The wisdom of such course has been fully demonstrated.

Prior to October 15th, however, on October 1st, the Purchasing Department called for bids and entered into contracts for four of the largest schedules of supplies for the state institutions, covering an eight-months period, namely: flour, tea, dried fruits and beans. Bids for the fifteen institutions were called for collectively, and the prices received demonstrated the effectiveness of the system.

Immediately upon taking over the sixty-five offices and commissions above referred to, an endeavor was made to standardize on stationery and office supplies, working upon the presumption that any given article satisfactorily used in one department for a given purpose, should be equally satisfactory in any other department when used for the same purpose, eliminating as far as possible all proprietary articles, the exclusive use of which precluded securing competitive prices.

In October, we requested bids for electric lamps, and on November 15th entered into contract with the Westinghouse Lamp Company to furnish all the lamps used by the various departments, schools and institutions, and in this contract agreement, all benevolent institutions supported in whole or in part by the state were privileged to participate to the extent of securing the same terms as the state.

In November, 1915, we purchased for the Norwalk State Hospital their equipment for kitchen and dining rooms.

In February, 1916, we decided it best for the state to discontinue the indiscriminate purchase by the operators of the automobiles and trucks owned by the state, of tires, casings, tubes and tire accessories. Bids were called for from all the leading manufacturers of these items to cover the state's requirements, and the award of the business on tires and casings were made upon the guaranteed cost per mile of service. The results of such an arrangement have been very satisfactory.

In December, 1915, we decided that it would be good business to discontinue the purchase of carbon paper and typewriter, adding, computing and tabulating machine ribbons, in small quantities by each of the offices, and to ask for bids and enter into contracts for furnishing all the departments. The various offices were paying from $1.00 to $4.50 a box for carbon paper, according to the individual preference of the user, and 75 cents each for the ribbons. As a result of asking for such bids, all offices are now using on contract, paying 80 cents a box for carbon paper and 30 cents each for ribbons, making a very substantial saving when the quantities used are considered.

In May, 1916, we purchased on bids the equipment for the Fresno State Normal School. Also, at the same time, we took over the Office Supply Department and arranged to buy in quantities and supply all departments of the state from the central storehouse.

In June bids were called for and contracts entered into for supplies required by the fifteen state hospitals, prisons, homes and reform schools, handling the total requirements for all institutions at one time.

A total of 331 bidders submitted quotations, and the prices secured were very satisfactory. The length of time covered by such bids were varied on the several schedules, according to our judgment as to market and crop conditions covering such commodities. For instance, on schedules covering grains, cereals, produce, dried fruits, rice, etc., bids were requested for a three months' supply, which would provide for requirements to October 1st, at which time the new crop would be available. On sugar, bids were requested to cover three months' supply only, for the reason that the price of sugar was unduly high at that time, it being the beginning of the fruit canning season. As proof of the correctness of this assumption, the average price obtained on the three months' schedule on granulated sugar was $7.75 per cwt., delivered, while the price secured three months later on the nine months' requirements, covering about 800,000 pounds, was $6.25 per cwt., a saving of $1.50 per cwt., or $12,000.00 less than the same would have cost the first of July.

On July 1st, we took over the purchasing for the Engineering Department and State Harbor Commission, absorbing their purchasing departments as far as possible; also the Testing Department and Laboratory of the Engineering Department, as well as the entire purchasing, contract and noncontract, for the institutions.

On September 1st we took over the purchasing for all the normal schools.

We are now doing the purchasing for all state departments and institutions except the State Highway Commission and the University of California, making more than one hundred departments in all, the purchasing for these various departments and commissions aggregating several millions in value annually and comprising almost every known commodity.

We have organized our department into divisions according to commodities and provided experts in the various lines as chiefs of the divisions.

Division No. 1. Under the direct charge of the State Purchasing Agent, this division handles both the contract and non-contract purchase of all food and forage supplies of every kind, also all grains and seeds for farm use, supervises all schedules and specifications, enters into all formal contracts and acts in an advisory capacity with the chiefs of all other divisions.

Division No. 2. Under the supervision of Assistant State Purchasing Agent H. L. Warren, formerly purchasing agent of the Highway Commission for the past four years, assisted by Mr. C. O. Palm, formerly with the purchasing department of the State Engineering Department for four years, this division handles all purchases of hardware and metal supplies, machinery, paints, oils (fuel and lubricating), glassware, electrical apparatus, building material of all kinds, crockery and kitchen equipments, lime, cements, road and bridge materials.

Division No. 3. Under the supervision of Mr. E. H. Kahrs, for fourteen years past buyer for one of the largest general dry goods firms of northern California, this division handles the purchase of clothing of all kinds, dry goods, fabrics, boots, shoes and leather goods, drugs and chemicals, laboratory supplies, notion specialties, rubber goods and hospital supplies.

Division No. 4. Known as the Supply Department, this division is under the supervision of Mr. J. F. Mispley, who has for several years been connected with George G. Radcliff, Superintendent of Building and Grounds, and had charge of the supply department for the Sacramento state offices under his direction. This department is being enlarged as rapidly as our funds will permit, with the ultimate object of standardizing all office supplies and buying the same in large quantities for cash, and keeping a stock of sufficient quantities of office supplies to furnish all state departments with their requirements from the Supply Department at cost, which will mean a saving of many thousands of dollars annually.

A detailed report of the activities of this division is made hereafter in the report.

In addition to this, the chief of this division has in hand the purchase of all office furniture, office devices and machines, carpets and floor coverings, books, periodicals, maps and school supplies.

Division No. 5. This division is our Accounting and Statistical Department, and is under the supervision of Chief Clerk, Mr. G. E. Baugh. The importance of this division cannot be overestimated. In addition to keeping the proper records of the expenditures of the Purchasing Department funds, we have installed a comprehensive commodity card system of records, so that we may have at the close of a year's work, dependable and accurate records of the quantities used of the various commodities by the several institutions and departments. This information will be of invaluable assistance to the department in estimating accurately the quantities required to care for the needs of the various institutions and will be of particular assistance in entering into term contracts and comparison of prices.

One of the greatest handicaps to our first year's work has been the lack of just such accurate information, the estimates presented in many cases being very far from the actual quantities required. This works a hardship and frequently a loss either on the bidder or the institution. Especially is this the result when there is an unsettled and constantly fluctuating market as during the past year. If the quantities are underestimated, the result is that we have to procure the shortage in the open market in the lesser quantities and at an advanced price. If the quantity is overestimated, the vendor who takes the contracts and has provided the necessary stock to care for it, is left with goods on his hands that he may have to dispose of at a loss, besides having his money tied up in the larger stock. Correct estimates of quantities used are therefore important.

Division No. 6. This is our Testing Department and is under the supervision of Mr. E. D. Griffith, Testing Engineer. The importance of this department is in its ability to determine the value and efficiency of many commodities on which we ask for bids and request submitting of samples. It is also invaluable in securing deliveries of goods that are the equal in every way of the goods contracted for. In order, however, to secure the full efficiency of this department, we must have the full and hearty cooperation of the persons whose duty it is to receive and report on the goods delivered at the various institutions and departments.

Division No. 7. This division has in charge the purchase of all materials used on the water front of San Francisco, covering wharves and docks over fourteen miles in length, the Belt Railroad, and the various tugs, launches, pile drivers, etc., of the State Harbor Commission. The division is known as the Harbor Commission Branch of the State Purchasing Department, and is under the supervision of Mr. Arthur J. Burton, who has been connected with the Harbor Commission in various capacities for the past five years, and prior to that was for several years purchasing agent for one of the largest firms of railroad contractors and builders on the coast. We expect also in the near future to establish a supply department in connection with the harbor branch to take care of the office supplies for the offices and departments in San Francisco and around the bay.

Our organization is now practically complete and thoroughly capable of handling the immense business of the state intelligently and successfully, and equipped with such an organization you have every right to expect accomplishments during the next year that will be highly gratifying.

In our efforts to standardize, systematize and centralize the purchasing of supplies, we have endeavored to be patient, fair and pleasant, and at the same time insistent on what we believed to be right. We have tried earnestly to enlist the hearty cooperation of all departments in our efforts for improvement, and without exception have found them ready to cooperate to the fullest extent. As opportunity has offered, we have visited all the institutions, commissions and various departments, and have discussed with the various heads the relation of their department with the Purchasing Department, endeavoring to get their viewpoint. We have invited their suggestions and have always given them earnest and careful consideration.

In our purchasing, efficiency, quality and price are the only factors considered. In our awards of business, we have been absolutely fair. Every reputable business concern which has desired to compete for the state's business has been given the fullest opportunity. Whenever an unsuccessful bidder questions an award, the records of our office are opened to his scrutiny and in every instance thus far we have been able to satisfy him as to the fairness and justness of our award. We have endeavored to instill into the minds of the business and tradesmen of California that the state will give them a square deal, and also that the state will insist on a square deal at their hands. We do not want any man to do business with the state of California without a legitimate profit, but we insist, without exception, that when an agreement or contract has been entered into with the state to furnish a given article at an agreed price, that article or its equal in every sense, must be delivered, and in accomplishing this delivery we have been ably seconded by the Pure Food and Drug Laboratory and our Testing Department. In this also it is of paramount importance that we receive the hearty and intelligent cooperation of the various commissaries, business managers, or others whose duty it is to receive and examine the goods.

In determining the accomplishments of the Purchasing Department this first year, it would be manifestly unjust to compare the prices paid in this abnormally high price year with the prices paid for the same commodities in the past normal business years; rather, we should compare the prices paid by the state with the quoted jobbing or quantity market prices. Every one in and out of business is familiar with the fact that prices on every known commodity are from twenty-five to over one hundred per cent higher this year than ever before known in the recollection of any of us. In some lines, we found it impossible to secure contracts for future delivery on account of the uncertainty of the price, as well as the difficulty of securing supplies, and we have been forced to buy in the open market as the need arises. On many lines, it has been a question of finding the available supplies more than a question of price.

At no time in the history of the state could a purchasing department have been inaugurated under such adverse and trying trade conditions, but in spite of all these conditions we believe we can show results which will demonstrate the wisdom of the administration in creating such a department.

In corroboration of the foregoing statement, we submit for your consideration a tabulated statement of the work of the department:

STATISTICAL DEPARTMENT.

In presenting the statistical phase of the work of this department we give a short, concise and intelligent description of the manner of keeping the records and data of the department and its work and the purposes served by such records; also, the amounts actually spent through the medium of this department and the labor and expense involved in its establishment and maintenance.

All purchasing is classed under two general heads, viz: ''noncontract'' and ''contract.'' In the noncontract class are all such purchases as might otherwise be classed as ''emergency,'' ''urgent'' or ''not anticipated.'' These entail a constant series of bids and tabulations thereof, to sift out the market and make the best possible bargains, and are necessarily not as satisfactory nor as economical as are the ''contract'' variety. It will be seen in the comparative totals that it is more economical to buy standard goods at agreed prices for reasonably long periods of time, than to consume so much time and overhead expense on ''noncontract'' purchases, governed, however, by market and supply conditions.

From November 1, 1915, to July 1, 1916, all noncontract buying was classified under some thirty or more heads, but when we took over the buying for all departments the system had to be enlarged to meet the enormous volume of business commencing with July 1, 1916, and the present card ledger record was adopted. The card ledger record is of such a nature that practically any and every known commodity which can possibly be of use to any portion of the state's official activities along the lines of equipment, materials and supplies may be totaled as to amount purchased in the aggregate, or amount purchased by any one or more institutions or offices. They are of two sorts, ''contract'' and ''noncontract,'' and by having one a different color from the other, the records are easily distinguished. The ''contract'' records will show deliveries made under contracts. The ''noncontract'' records show all other purchases, listing each commodity as purchased for each department or institution, showing the quantity and price.

The amounts spent by the various institutions and departments of the state as evidenced by contracts awarded through this department up to November 1, 1916, covering the various commodities needed, are as follows:

Equipment—school, laboratory and office	$13,571 89	
Furniture	29,680 85	
Groceries	255,093 40	
State Printer's supplies	44,357 95	
Paper drinking cups and special paper	1,265 00	
Cereals, including poultry foods and grains generally	403,264 76	
Produce, such as beans, potatoes, cabbage, etc.	112,594 77	
Electrical supplies	20,188 67	
Fuel, both liquid and solid	129,655 57	
Provisions, including butter, cheese and lard	116,025 80	
Rubber goods	6,871 29	
Paints, and paint oils, etc.	26,555 97	
Tobacco and pipes	22,801 87	
Fresh fish (approximate only)	7,954 40	
Soap, lye and laundry supplies	49,881 67	
Crockery	7,791 30	
Wines and liquors	3,207 80	
Brooms, brushes and materials for making same	10,332 90	
Dry goods, hats and clothing	172,685 29	
Meat	402,209 48	
Window glass (in boxes) approximate	5,000 00	
Leather and shoe findings	98,852 69	
Photographic supplies	5,665 54	
Lubricating oils and grease	4,647 14	
Special supplies for "Post" store at Veterans' Home	376 00	
Sporting goods	2,918 43	
Blankets	27,080 82	
Dental supplies	5,011 44	
Hay and straw	20,169 00	
These made a grand total for contract purchases of		$2,005,711 99
In the classification of *noncontract* purchases, made prior to July 1, 1915, the total of all purchases was (for eight months)	$111,741 92	
From July 1, 1916, to November 1, 1916, the total of the same kind of purchase was (for four months)	318,393 63	
Total for main office of *noncontract* purchases is		430,135 55
The Harbor Commission Branch in San Francisco purchased, of *noncontract* articles, from July 1, 1916, to November 1, 1916 (for four months)		123,232 06
The grand total of all purchasing actually recorded is		$2,559,079 30

Other contracts under consideration, and some awaiting final approval, together with the noncontract purchases since November 1, 1916, will carry the total amount of all purchases for 1916 over the $3,000,000.00 mark.

The original appropriation of $50,000.00, set aside by the last legislature for the sixty-seventh and sixty-eighth fiscal years for the support and maintenance of the State Purchasing Department, proved inadequate partly because $15,474.13 was used (up to November 1, 1916) in procuring the necessary stock to properly conduct the supply department. The use made of this amount is shown later.

To carry the department along until the incoming legislature would provide funds for further work, the Board of Control, with the approval of the State Controller, set aside from the State Emergency Fund an additional $15,000.00.

The disbursement of these amounts up to date has been made as follows:

Funds available:			
Original appropriation			$50,000 00
Emergency fund additional			15,000 00
Total appropriations			$65,000 00
Disbursements:			
Salaries—			
Main office (entire period)		$24,741 68	
Harbor branch (four months)		2,250 00	
Testing Department (four months)		2,875 00	
Total salaries		$29,866 68	
Supply Department		15,474 13	
Furniture and fixtures—			
Main office	$2,830 75		
Testing Department	1,457 62		
		4,288 37	
Office supplies		4,390 27*	
Postage		1,021 11	
Traveling expenses		466 88	
Advertising		355 09	
Telephone and telegraph service		386 77	
Towel service		14 25	
Miscellaneous (subscriptions, clippings, experts, etc.)		186 91	
Express and drayage		72 43	
Balance available, November 1, 1916		8,477 11	
			$65,000 00

Taking the "Supply Department" amount of $15,474.13 out of the "Expense" items, as it is virtually an asset, the net expense is thus seen to be $41,048.76.

Since the total of purchases consummated is over $2,559,000.00, and the cost as above, $41,048.76, the ratio of cost is seen to be a little over 1½ per cent.

Included in this percentage, however, it must be borne in mind, is the entire equipment essential for many years of work, with systems already established which will be productive of still greater economy.

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*We also call your attention to the fact that this department now furnishes to all the departments all their requisition, order and goods received forms and blanks, also has printed all specifications, contracts and bonds, an expense heretofore borne by the various departments, now furnished by this department in order to secure uniformity. This explanation will account for the large expenditure for office supplies.

The office force is shown as follows:

Executive.
- One Purchasing Agent in Chief.
- One Assistant Purchasing Agent.
- One buyer of fabrics, chemicals and apparatus.
- One buyer of stationery and office furniture and supplies.
- Two buyers of hardware, structural materials, etc.
- One testing engineer.
- One Chief Clerk.

Clerical, Etc.
- One Storekeeper.
- One Record Clerk.
- One Filing Clerk.
- One Assistant Testing Engineer.
- One Chemist.
- Five General Clerks.
- Thirteen Stenographers.
- One Janitor.

SUPPLY DEPARTMENT.

The supply department began with a nucleus of stock turned over to the Purchasing Department by the Superintendent of the Capitol Building and Grounds, inventoried at $4,014.65, and up to October 31, inclusive, spent $15,474.13 for increased stocks, making a total valuation of stock handled of $19,488.78.

The sales from this department to all state officers and institutions which came under its jurisdiction were as follows:

May	$468 18
June	661 62
July	1,503 75
August	2,113 84
September	2,514 95
October	3,043 17
Total	$10,305 51

Of this amount there has been actually received in payment of stock sold to the various state offices, etc., $7,091.42, and is still outstanding $3,214.09.

The stock on hand is valued at $9,183.27.

To summarize:

Stock on hand, May 1, 1916		$4,014 65
Stock purchased, May 1, 1916, to October 31, 1916 (incl.)		15,474 13
Total stock handled		$19,488 78
Cash from sales	$7,091 42	
Outstanding accounts	3,214 09	
On hand November 1, 1916	9,183 27	
Total		19,488 78

It will be seen that sales are increasing as the immense saving in buying supplies through this department is realized, and its advantages are now being generally recognized all through the state's work.

One item of paper, manila wrapping, used in large quantities, is given as an illustration of the fact that if a large revolving fund was at the disposal of this department, the saving effected would be much greater than it is. This article was bought in July at $.065 per pound. In September, another lot cost $.071 per pound. In November, one ton was bought at $.08 per pound, and the present market price is 10 cents per pound.

As a matter of general enlightenment, we give as concrete illustrations of the accomplished savings in this one department the following statement of items of stock, taken from last inventory, giving in columns the prices paid by the supply department, then the prices quoted by the stationers at the same time to state offices and departments as each requisition would come from said offices and departments. In the last column is given the percentage of saving.

	Supply Dept. Prices	Market Prices	Savings Per Cent
Board files, No. 4E, each	$0 34	$0 90	60
Calendar pads and stands "Bunch of Dates," each	41	1 00	59
Erasers, red rubber, dozen	20	60	67
Erasers, circular, dozen	23	60	60
Box files, each	23	1 00	77
Hotchkiss stapling machines No. 1, each	1 25	2 00	38
Inkstands, Capitol No. 2, each	34	50	32
Ink eradicator, each	175	35	50
Ink, black, 4-ounce, Edwards, each	05	10	50
Ink, quarts, Staffords, each	73	1 25	42
Mucilage, pints, each	325	75	57
Mucilage, quarts, Carters "Arabin," each	625	1 20	48
Punches, Triumph, each	1 25	2 50	50
Paper, adding machine, 2 5/16", roll	0745	15	50
Paper, adding machine, 3 15/32", roll	11	25	56
Paper, blotting, 19 x 24", each	04	10	60
Paper, blotting, 4 x 9½", dozen	04	10	60
Paper, manila pads, legal, dozen*	1 61	2 00	20
Paper fasteners—			
Sure shot staples, No. 1, thousand	17	30	43
Gem clips, No. 1, thousand	31	1 00	69
Challenge eyelets, No. 1, box	09	30	70
Dennison's RH, No. 22, box	11	30	63
Paste, Edwards, 8-ounce, each	34	50	32
Paste, Edwards, quarts, each	35	1 00	65
Pencils, Dixon Ticonderoga, gross	3 23	5 25	38
Pencils, Dixon Golden West, gross	2 45	4 00	39
Pencils, Venus, 2H, 3H, 4H, 6H, gross	7 10	12 00	41
Pencils, Blaisdell, dozen	68	1 20	43
Pencils, Eagle, No. 957, dozen	58	1 00	42
Penholders, Eagle, No. 173, dozen	38	50	24
Penholders, E. Faber, No. 2440, dozen	09	20	55
Pins, pyramid, No. 4, each	07	15	53
Pins, No. 4, ½-pound boxes, each	375	75	50
Reporter's note books, each	1 80	4 50	60
Rubber bands, No. 10, gross	06	15	60
Rubber bands, No. 18, gross	13	35	63
Rubber bands, No. 30, gross	23	50	54
Rubber bands, No. 33, gross	32	65	51
Rubber bands in 1-pound boxes, 1 pound	1 17	1 45	19
Twine, B. C. flax, 1 pound	26	50	48

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*Manila pad furnished from our stock contains 100 leaves. Stock pad of stationers contains only 72 leaves.

This list does not cover all our supplies, only those of most frequent use. To demonstrate that these savings are actual and not theoretical, we call your attention to the following requisition which was purchased by this department after the fullest competition by bidders. This was just prior to the inauguration of our Supply Department. In the first column is shown the lowest bidder's prices and in the second column the prices at which these articles could have been furnished from our Supply Department.

	Lowest Bidder's Prices	Supply Dept. Prices
24 blotters, 19 x 24	$1 70	$0 40
12 erasers, Eagle 493	50	23
12 erasers, Robers 37-40	50	24
24 manila tablets, 8 x 12½	3 00	1 20
12 reams mimeograph paper	6 00	4 08
4 dozen indelible pencils	4 00	1 18
6 rolls Dennison's adhesive tape	30	15
3,000 Hotchkiss staples, No. 1	1 50	53
1,000 Gem clips, No. 1	1 50	20
6 bottles paste, 8-ounce	1 80	1 25
6 balls No. 18 twine	90	57
6 typewriter ribbons	3 00	1 80
6 No. 12 transfer cases	2 40	1 08
	$27 10	$12 91

Innumerable comparisons of this nature could be made from requisitions in our files. The above is quoted only with a view to illustrate the actual results which may be obtained through centralized buying. Each requisition in itself does not amount to a great deal, but from records so far, purchases of this sort would aggregate, had we the necessary funds to carry the stock, between $75,000.00 and $100,000.00 yearly. The savings shown range from 20 per cent to over 77 per cent. The results obtained have amply justified the establishment of the central store or supply department.

In order to give some idea of the large quantities of some of the items used by the state departments in the last six months (from May 1, 1916, to November 1, 1916), attention is called to the following list. This includes only the items supplied from our central store room.

Memorandum books	429	
Receipt books	185	
Crayon, white	480	gross
Drinking cups—paper	24,000	
Carbon paper	548	boxes
Erasers	3,757	
Box letter files	226	
Inkstands	151	
Ink—pints	193	
Ink—quarts	233	

Paper—adding machine rolls	659	
Paper—blotting, 19 x 24	5,548	
Paper—manila pads	1,981	
Paper—white ruled pads	1,325	
Paper—mimeograph	720	pkgs.
Paper—typewriter	2,411	boxes
Paper—wrapping, quires	1,387	
Paper—wrapping, rolls	74	
Paper—toilet	138	cases
Gem clips	252,100	
Hotchkiss staples	150,500	
Paste, 8 oz.	393	jars
Paste, pints	161	
Paste, quarts	91	
Pencils	3,313	doz.
Pens	451	gross
Penholders	547	doz.
Pins, pyramid	561	
Pins, ½-lb. boxes	51	
Reporter's note books	1,177	
Rubber bands	1,272	gross
Rubber bands, ½-lb. boxes	53	
Rulers	386	
Thumb tacks	45,136	
Typewriter ribbons	1,113	
Twine, ½-lb. balls, flax, balls	1,142	
Twine, cotton, balls	658	

We wish also to advise of the fact that our Supply Department has made ample provision to take care of all office and stationery supplies needed by the legislature, having a sufficient quantity on hand to care for their needs at the quantity cost price charged all institutions, thus insuring a considerable saving, to say nothing of the convenience and satisfaction to members by having a supply in the building.

FABRIC DEPARTMENT.

Reinforcing the records just given, by taking some pages from the fabric department, we append the following table of results, showing as actual savings, figured on a basis which leaves no shadow of room for doubt, a total amount, in just these few items, which will pay for the department's entire expense from July 1 to November 1, 1916, and leave a good margin besides.

The table is self explanatory, but we add that the term "rejected price" means the lowest price at which competitors bid on the various lines listed, which was deemed in our judgment to be high, when all bids were rejected. In going into other fields of competition the contract price was secured and our judgment shown to be accurate by the column of "actual saving."

As speculative saving, using "today's prices" for the self-same lines, we give another column, which of course makes possible the "gross saving" column, as shown.

Item	Rejected Price	Contract Price	Actual Saving	Today's Price	Gross Saving
1,348 doz. handkerchiefs	$0 72½	$0 65	$101 10	$0 87½	$303 30
16,200 yds. cheviot	10½	099	97 20	12	340 20
21,800 yds. cheviot, Otis	14¾	13½	327 00	15½	490 50
27,350 yds. Russian crash	12	092	765 80	13	1,039 30
10,000 yds. denim, 7-oz.	20	17¾	225 00	229	515 00
23,550 yds. denim, 8-oz.	22½ 31	21½	235 50	24½	706 50
95,070 yds. canton flannel	17¾	13½	3,089 77	19	5,228 85
42,000 yds. hickory	15½	131	1,008 00	17½	1,848 00
4,800 yds. linen, 63-in.	85	364	2,332 80	1 00	3,052 80
101 doz. napkins, 24-in.	3 50	1 85	166 65	2 25	40 40
680 doz. damask, 72-in.	1 10	4482	443 23	1 75	885 22
2,200 yds. 33-inch bl. Indian Head	11	10½	11 00	14	77 00
31,100 yds. 36-in. brown Indian Head	11	09½	388 75	13	1,088 00
30,800 yds. ticking, 32-in.	21	15½	1,694 00	24½	2,772 00
7,800 yds. 4/4 sheeting	12	09½	195 00	12½	234 00
13,450 yds. 5/4 bleached sheeting	21	1765	450 57	21½	517 82
7,800 yds. 5/4 brown sheeting	20	16¾	255 00	20¾	312 00
5,400 yds. 6/4 bleached sheeting	28½	23½	270 00	28½	270 00
37.100 yds. 6/4 brown sheeting	25½	19½	2,226 00	25½	2,226 00
7,400 yds. 7/4 bleached sheeting	31½	26½	370 00	31½	370 00
15,400 yds. 7/4 brown sheeting	29	232	893 20	29	893 20
4,950 yds. 9/4 bleached sheeting	38	32	297 00	38	297 00
3,200 yds. 9/4 brown sheeting	35½	294	163 20	35½	163 20
2,000 yds. 10/4 bleached sheeting	40	35	100 00	40	100 00
75 coats (for Veterans' Home)	9 75	7 00	206 25	10 35	251 25
250 pants (for Veterans' Home)	6 75	4 25	625 00	6 75	625 00
160 blouses (for Veterans' Home)	7 60	6 00	400 00	7 60	400 00
Actual total saved			$17,337 02		
Total saved, based on today's prices					$25,046 54

As an indication of the saving effected by concentration of the purchasing in the one department, we submit a few figures. These are from the actual records and not theoretical or imaginary.

In comparing the figures representing these purchases for the past year we must ask you to keep in mind the fact that the average advance in prices on all commodities over the general prices ruling a year ago is between 50 and 75 per cent.

	Total Purchase on Contracts	Increase over Last Year's Price
Schedule No. 1—Groceries	$255,093 40	3⅓ per cent.
Schedule No. 3—Produce	112,594 77	32 per cent.
Schedule No. 4—Meats, fresh and cured, butter, cheese and lard	518,235 28	*¼ of 1 per cent.
Schedules Nos. 5 and 6—Flour, grains, cereals and forage	403,264 76	35 per cent.
Schedule No. 9—Soap, laundry supplies	49,881 67	5 per cent.
Schedule No. 11—Dry goods and fabrics	172,685 29	15 per cent.
Schedule No. 13—Leather and shoe findings	98,852 69	24 per cent.

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*Decrease from last year's price.

The above schedules give the total amount $1,610,607.83, on which the prices paid this year show an average increase over last year's prices of 13 per cent, while the regular quoted jobbers' or wholesalers' prices on the same lines would show an increase of at least 50 per cent.

We also give below a list of prices on a few of the commodities used in very large quantities by the institutions. The first column shows the price on our contracts, the second column gives the quoted jobbing or wholesale prices taken from the wholesale price lists:

Article	Contract Price	Wholesale Price
Apples, evaporated	$0 0598	$0 08¼
Apricots, dried	115	13
Bacon, No. 1	17	26
Barley, whole	1 81	2 40
Barley, rolled	1 75	2 40
Beef, fresh	1115	12
Bran, feed	1 25	1 40
Beans, pink	5 00	7 40
Beans, small white	6 35	10 75
Beans, large white	6 20	10 50
Beans, Bayo	5 10	7 15
Beans, lima	5 52	7 90
Butter, fresh creamery	2839	335
Coffee	14	155
Coal, range	*8 85	†9 50
Corn, canned, No. 2 cans	8098	1 10
Cornmeal, white, per hundred weight	2 39	3 70
Flour, white, barrel	6 94	8 60
Flour, graham, per hundred weight	2 90	4 40
Ham, No. 1	1725	24
Lard, 50 pounds	1195	185
Lard, substitute	1098	16
Leather, sole No. 1	445	78
Lead, white, in oil	0973	105
Macaroni, etc.	0305	07
Middlings	1 55	1 95
Mutton, fresh	135	15
Oil, linseed, raw	76	1 08
Oil, linseed, boiled	77	1 10
Oats, rolled	3 14	4 40
Oatmeal	3 15	4 70
Peas, canned, No. 2 cans	8225	1 05
Peaches, dried	0612	07
Prunes, 60's-70's	072	08¼
Potatoes	1 69	2 25
Onions	2 40	3 25
Sugar, D. G.	6 10	7 60
Sugar, G. C.	5 90	7 10
Sugar, cube	7 06	8 10
Sugar, powdered	6 82	7 85
Turpentine	59	62
Wheat, cracked, chick food	2 425	2 85

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*Long ton.
†Short ton.

These comparisons we believe are ample testimony to the efficiency of the department, and abundantly justify the wisdom of the administration in creating such a department.

TESTING LABORATORY.

Since the laboratory was taken over by the State Purchasing Department, July 1st, we have received to December 1st, seven hundred and fifty-three samples, of which seven hundred and seventeen have been tested, the balance of thirty-six samples not being tested for various reasons. This is an average of one hundred and forty-three samples tested per month or six samples tested each working day, which means approximately from twenty to twenty-five separate tests. This includes samples of:

Blankets.
Coal.
Dry paint colors.
Paint colors in oil.
White lead.
Litharge.
Paris white.
All kinds of varnishes.
Enamels.
Glues.
Pumice stone.
Lubricating oils.
Rotten stone.
Flake shellac.
Shingle stains.
Floor wax.
Wood stains.
Water-proofing paints.
Alcohol.
Metal lath.
Asphalt.
Gasoline.
Stove oil.
Building tile.
Sand.
Shellac in alcohol.
Rock.
Deadening felt.
Ready roofings.
Paint oils.
Fuel oils.
Kerosene.
Reinforcing steel.
Cement.
Self-centering reinforcing steel.
Concrete cylinders.
Rosin sized paper.
Lubricating greases.
Irish flax flashing.
Canvas.
Metals for automobile plate seals.
Various fabrics.
Pickles.
Rubber hose.
Mixed paints.
Turpentine.
Leather hides.
Soap.
Galvanized iron.
Zinc oxide.
Various packings for machinery.
Creosote.

Out of the many hundred samples tested there have been numerous rejections, with the result that a second delivery, or in some instances, a third delivery, has been correct.

To give an idea of some interesting features in connection with the testing, we call attention to a few tests which have been made.

Some paint was required for use at the State Capitol. The paint asked for, Lab. No. 3624, weighed 16.84 pounds per gallon, contained only a trace of water and 2.5 per cent of volatile liquid. This paint cost $1.90 per gallon. A competition paint submitted, Lab. No. 3625, weighed 14.36 pounds per gallon, contained 28.38 per cent of water and 46.61 per cent of volatile liquid, this paint to cost $1.09 per gallon. Note the comparison of the tests made and imagine what possible use the latter could be.

Paint materials were required for painting the State Armory at Stockton, Cottage for Males and Cottage for Convalescent Females at the Stockton State Hospital. In the first lot of nine samples submitted five rejections were necessary.

The Golden Ochre, Lab. No. 3578, was not ground in oil, as required, but contained turpentine and dryer. There was excess of chrome present and it contained much insoluble residue and when tested with zinc oxide, a dye used in same predominated.

The Burnt Umber, Lab. No. 3582, was very thin and about 12 per cent lower in density than standard sample.

A sample of Zinc Oxide, Lab. No. 3579, contained only 39 per cent of zinc, where pure zinc was called for.

Another sample, Lab. No. 3573, contained 83.4 per cent of pure zinc.

It is interesting to note that the final sample of Zinc Oxide in Oil, Lab. No. 3612, tested better than 97 per cent pure. This is a marked difference from the first sample submitted, which tested 39 per cent pure.

Some time back, the State Department of Engineering had a great deal of trouble to obtain deliveries of dry wool roofing-felt up to specifications, particularly the material that should weigh 2 pounds to the square yard. Deliveries were made in some instances weighing around 1 and 7/10 pounds. Today nearly all the deliveries run very close to 2 pounds and above.

The result of tests made on the hundreds of samples that were submitted with state bids July 1st of this year is an indication of the constant necessity of having a competent and fully equipped Testing Department, and also the importance of the institutions sending samples from deliveries to be tested at frequent intervals.

Many of the samples submitted on July 1st were so poor that it was necessary for us to reject the bids on many varieties, in paint especially, and go into the open market and purchase, and in many cases, really good materials cost no more than the poor stuff bid upon, thereby proving the advantage accruing to the state as a result of the work of the testing department.

The various concerns soon notice those institutions which invariably follow up deliveries made to them, and send in samples of these deliveries for testing and little trouble is thereafter experienced. The firms are in close touch with matters and are familiar with the institutions that do this sort of thing, and it is safe to say that institutions which do not check up their deliveries will probably receive inferior goods.

Stockton State Hospital is the best example, in that Mr. Chestnutwood, the business manager, watches his deliveries very closely and can prove the beneficial results in quality, and show where money is being saved the state. Another instance is at Agnews State Hospital in the deliveries of lubricating oils. The oils delivered before testing and the oils being delivered at the present time are as different as milk is from water.

The total cost of operating the laboratory, less cost of new apparatus purchased, was $2,964.71 for five months ending December 1st. This means that the cost per sample tested was $4.13. In this is included all necessary traveling, consumable materials purchased, salaries and incidentals such as gas, electricity, telephone, telegraph, trucking and cost of samples purchased where necessary, etc. This cost is probably 30 per cent to 50 per cent under that which would be charged by a commercial laboratory for the same service.

RECOMMENDATIONS.

In the light of the experience thus far gained, we beg to submit a few suggestions in the line of improvement of methods.

Some of these suggestions will of necessity touch upon the methods now employed by the institutions in handling the various commodities after they have been purchased by this department.

The relation of the act of purchase with the receipt and care of the article by the institution are so closely identified that any improvement in the method will be to the advantage of both the institutions and the Purchasing Department. Any suggestions that we may make as to improvement at the institution's end, therefore, we trust will not be looked upon as criticism of present methods, but rather will be taken as given, in the broad spirit of cooperation and mutual benefit.

In order to be able to take advantage of opportunities to buy quantities of goods which the state uses regularly in its departments which may be offered at an attractive price by a seller, the consideration prompting the attractive price being the desire to turn the merchandise into cash, the Purchasing Department should have the use of a revolving fund of considerable size, payments from said revolving fund to be made only on the usual warrant of the Controller's office. The Purchasing Department could then buy for cash, making payment from the revolving fund, and distributing to the various departments as requisitioned, such departments paying the Purchasing Department the cost price, thus reimbursing the revolving fund, the distribution to be made in connection with the Supply Department, with no increase in cost.

A revolving fund would also enable us to take advantage of markets and make quantity purchases of the lines of merchandise handled by the Supply Department, paying cash for same, and thereby securing the lowest possible price.

An arrangement should also be effected whereby when the Purchasing Department buys a considerable quantity of goods for another department on which a good cash discount is given, providing the amount is paid within a certain time, the Purchasing Department could pay the amount from its revolving fund and thus secure for the state the cash discount, collecting the amount so paid from the other department, thus reimbursing the revolving fund. A saving of many thousands of dollars could be accomplished yearly by such an arrangement.

Under this suggestion the revolving fund of this department would be a sort of clearance house through which certain payments could be made in order to secure valuable cash discounts.

For example, just recently the Purchasing Department was called upon to purchase for the Napa State Hospital and the Agnews State Hospital a quantity of rubber sheeting aggregating $937.00. The purchase was consummated the latter part of the month and a discount of 3 per cent would have been allowed if payment could have been made on or before the 10th prox.

Again, a quantity of Corticelli silk thread was purchased for the Agnews State Hospital, terms 8 per cent if paid in ten days after receipt of goods. Cash discounts of 2 or 3 per cent are very general, 5 per cent frequent, and 8 per cent occasionally.

Under the present system of approval by the boards of the various institutions, who usually meet once a month for such purpose, with the transmittal of claims and their approval by the Board of Control, the full course of which consumes from forty to sixty days, no cash discounts can be taken advantage of. Indeed the state business is thus placed upon nearly the same time basis as the average credit business in the business world, sixty days.

The only advantage the seller sees then in the state's business is that there is no element of loss therein from failure or inability to pay. Hardly a day goes by that this department does not receive letters from various firms who are selling to the state complaining of delays in receiving payment for goods delivered. Many of these letters of course refer to delays caused by some lapse or misunderstanding on the part of the firms, but many others have a perfectly legitimate and reasonable cause of complaint. One of the chief causes of delay we believe to be a duplication of functions and work of the several boards and departments. During the process between the rendering of the service to the payment of the claim, duplication of function and work should be eliminated as far as possible consistent with the proper safeguarding of the public funds.

If the payment of bills could be speeded up so that all bills would be paid on an average of thirty days after the delivery of the goods, there would be such general satisfaction among the merchants and manufacturers that the greatest possible competition for the state's business would result.

A better, more reliable and complete record of the requirements in the various institutions than now seems to prevail should be kept. One of the greatest helps to the accomplishment of this result would be the establishment in each institution of a central storehouse or commissary department, capable of taking care of all the commodities used by the institution. Everything should be received at this central storehouse and distributed from this storehouse to the various activities of the institution upon proper requisitions, and all the business of the institution relating to supplies should emanate from this central point. One man should be responsible for the receipt and disbursement of all supplies.

Particularly is the need of this central storehouse emphasized at San Quentin, which institution. by reason of being engaged in a number of manufacturing enterprises, has a multiplicity of departments and under present operation the Purchasing Department receives separate requisitions from the several departments of that institution, notwithstanding the fact that the materials used, many of them, are of identical lines. The shippers also are required to pack and ship according to the various departments of the institution, also to bill in the same manner. With a general storehouse under the supervision of one man with the necessary assistance, the various needs of the departments of the institution would be centralized and requisitioned in total quantities, thus permitting the larger quantity purchase. The shippers would ship altogether to the San Quentin Prison, billing the same accordingly. The goods would be received at the central storehouse and checked in by invoices. The central storehouse would make the segregation and deliver the stock to the various departments as requisitioned by them, keeping the accounts against the several departments. By this method we are convinced that a much better check would be kept upon the various activities of the institution, which we believe would result in sufficient saving to compensate for the expense of the central storehouse in a short time.

The above outline we believe is equally applicable to every other institution and the advantage accruing would be commensurate with the amount of business done.

Such record should be kept that those in authority at the institution would know at the end of the fiscal year exactly the amount of every commodity used by the institution. Preparing the estimated requirements for the next period would then be a very easy matter.

During the past year the Purchasing Department has found it necessary to procure certain lines of goods from the East, and in many cases it has been found expedient to pool the shipments for the several institutions and ship the several lots in one package to the Harbor Commission Branch of the Purchasing Department and reship to the several institutions from that point. In handling the shipments in this manner the Purchasing Department should prepay the charges to the various stations, and also it should prepay all shipments made from our Supply Department. For the expense so incurred and also the initial freight, cartage, etc., incident to the purchase and delivery of the goods to the Supply Department, we should be allowed to charge the institution and departments a 5 per cent addition over and above the actual cost price on all merchandise furnished from the Supply Department stock. There is breakage and shrinkage inevitable in handling such goods, also boxing and packing for which this department makes no charge, and this 5 per cent would also provide for that. In justice to the Purchasing Department, our funds should be reimbursed by the other departments to an extent equal to the amount of expense incurred in handling and shipping the goods.

Under the present arrangement the Testing Department forces are divided, one part at Agricultural Park and one part in the Forum Building. Division entails increased expense. Suitable space should be provided in the Capitol Extension Building to accommodate an adequate laboratory and equipment.

All of which is most respectfully submitted.

W. G. McMILLIN,
State Purchasing Agent.

BIENNIAL REPORT

OF THE

Board of
State Harbor Commissioners

FOR THE

Fiscal Years Commencing July 1, 1914 and Ending June 30, 1916

COMMISSIONERS:

J. J. DWYER, President T. S. WILLIAMS JOHN H. McCALLUM

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO
1916

27624

BOARD OF STATE HARBOR COMMISSIONERS.

J. J. DWYER, *President* – – – – – – – Commissioner
T. S. WILLIAMS – – – – – – – – Commissioner
JOHN H. McCALLUM – – – – – – – Commissioner

LEO V. MERLE, Jr. – – – – – – – – – – Secretary
JEROME NEWMAN – – – – – – – – – – Chief Engineer
DANIEL A. RYAN – – – – – – – – – – Attorney

OFFICE:
UNION DEPOT AND FERRY HOUSE
SAN FRANCISCO, CAL.

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LETTER OF TRANSMITTAL.

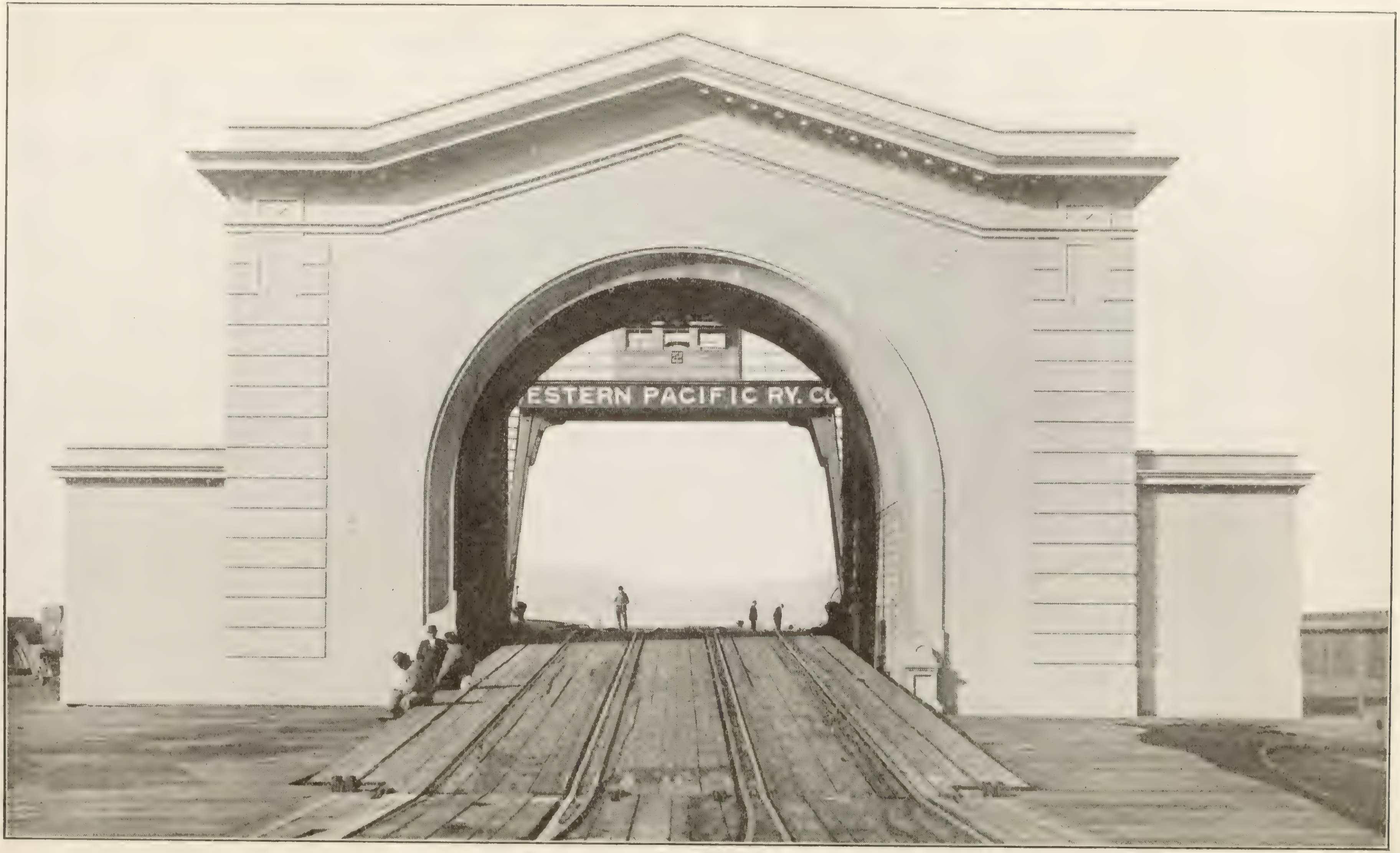
To His Excellency, HON. HIRAM W. JOHNSON,
Governor of the State of California.

SIR: As required by law, the Board of State Harbor Commissioners for the harbor of San Francisco herewith respectfully submits its biennial report for the fiscal years commencing July 1, 1914, and ending June 30, 1916, embracing a full report of all moneys by them received and disbursed, describing the improvements made or under way, and the general condition of the harbor property.

We have the honor to be
Yours very respectfully,

J. J. DWYER, President.
T. S. WILLIAMS,
JOHN H. MCCALLUM,
Board of State Harbor Commissioners.

San Francisco, California,
November 1, 1916.



HEAD HOUSE OF CAR FERRY SLIP

INTRODUCTION.

Personnel.

The present Board of State Harbor Commissioners consists of the following commissioners:

JOHN JOSEPH DWYER, President, THOMAS S. WILLIAMS and JOHN H. MCCALLUM, all residents of San Francisco.

Jurisdiction.

The only harbor under the jurisdiction of the Board of State Harbor Commissioners is that portion of the water front on the bay of San Francisco around the city and county of San Francisco, from the Presidio, the United States military reservation, on the north, thence around the bay front to the boundary line between San Francisco and the county of San Mateo. This report deals only with the commerce, construction, maintenance and operation of this water front. On the other side of the bay, at Oakland, Richmond and elsewhere, local bodies administer their respective harbor facilities.

The statistics and other data refer alone to the state property along the San Francisco water front, consisting of the seawall, the seawall lots behind the same, created by the reclamation of tide lands, The Embarcadero, formerly called East street, and other water front streets, the belt railroad, tugs and dredgers, and all the piers and wharves in the city and county of San Francisco, except those belonging to the federal government at the Presidio and Fort Mason, and some other few on private property.

Towage, Pilotage and Stevedoring.

The charges for towage and pilotage from the Pacific Ocean into San Francisco Bay are in no degree under the jurisdiction of the Harbor Board, but are governed by other bodies. Stevedoring is entirely a private business.

Public Ownership and Operation.

Unlike most of the leading seaports of the United States, San Francisco enjoys the advantage of a harbor front that is owned and operated by the public. The title of the property is in the state of California, and harbor affairs are administered by a board of three harbor commissioners, appointed by the Governor of the state and holding office during his pleasure.

The Harbor Self-Supporting.

Under the law, the harbor has been self-supporting since its inception. All the cost of construction and maintenance of seawalls, buildings, wharves, etc., as well as the operating expenses, are paid out of harbor receipts. These are derived from charges imposed upon shipping and cargoes, in the form of rents, tolls, dockage and wharfage for the use of the wharves; switching charges on the belt railroad; from the rental privileges of the seawall lots and of the ferry and other buildings and for the use of the ferry slips, and other lesser sources. The principal and interest of all bond issues must also be paid out of the same revenues. San Francisco harbor thus pays its own way, not a dollar coming out of the public treasury or taxes.

The advantage of public ownership to the shipping interests is shown by the provision of the law that harbor charges must not exceed the amount necessary to meet operating, repair and construction expenses and redeem bond issues. Aliens and citizens are treated on equal terms. It is estimated that if the present San Francisco harbor front and facilities were owned and operated by private interests, they would be capitalized at least for the sum of $250,000,000, and handsome returns could easily be made on that figure.

General Characteristics of San Francisco Harbor.

It is universally acknowledged that the harbor of San Francisco is in its natural aspects one of the very finest in the world. In size the bay of San Francisco, with its connecting waterways, is one of the very largest landlocked bodies of water anywhere.

On the San Francisco side, because of the scouring effects of the tide, the water is very deep, ranging from 34 feet at the seawall, which is the minimum required to be maintained by law, to from 50 feet to 75 feet at the outer ends of the piers.

It is admirably sheltered against severe storms, the annual damage to shipping from this source being but trifling; its extreme tidal range is only about eight feet and the mean less than five feet; it offers excellent anchorage over an immense area in convenient localities, with fine holding ground, and, in a word, it is ideal, as far as natural conditions are concerned.

It is the terminal point of four great transcontinental railroad systems, and has behind it and directly tributary to it the two immense valleys of the Sacramento and San Joaquin rivers, which drain much more than half the productive area of the extensive state of California. Likewise, the coast lines north and south of San Francisco are intimately connected with the harbor by important transportation systems, steadily ramifying into much new territory.

Extent of Seawall, Docks and Lands.

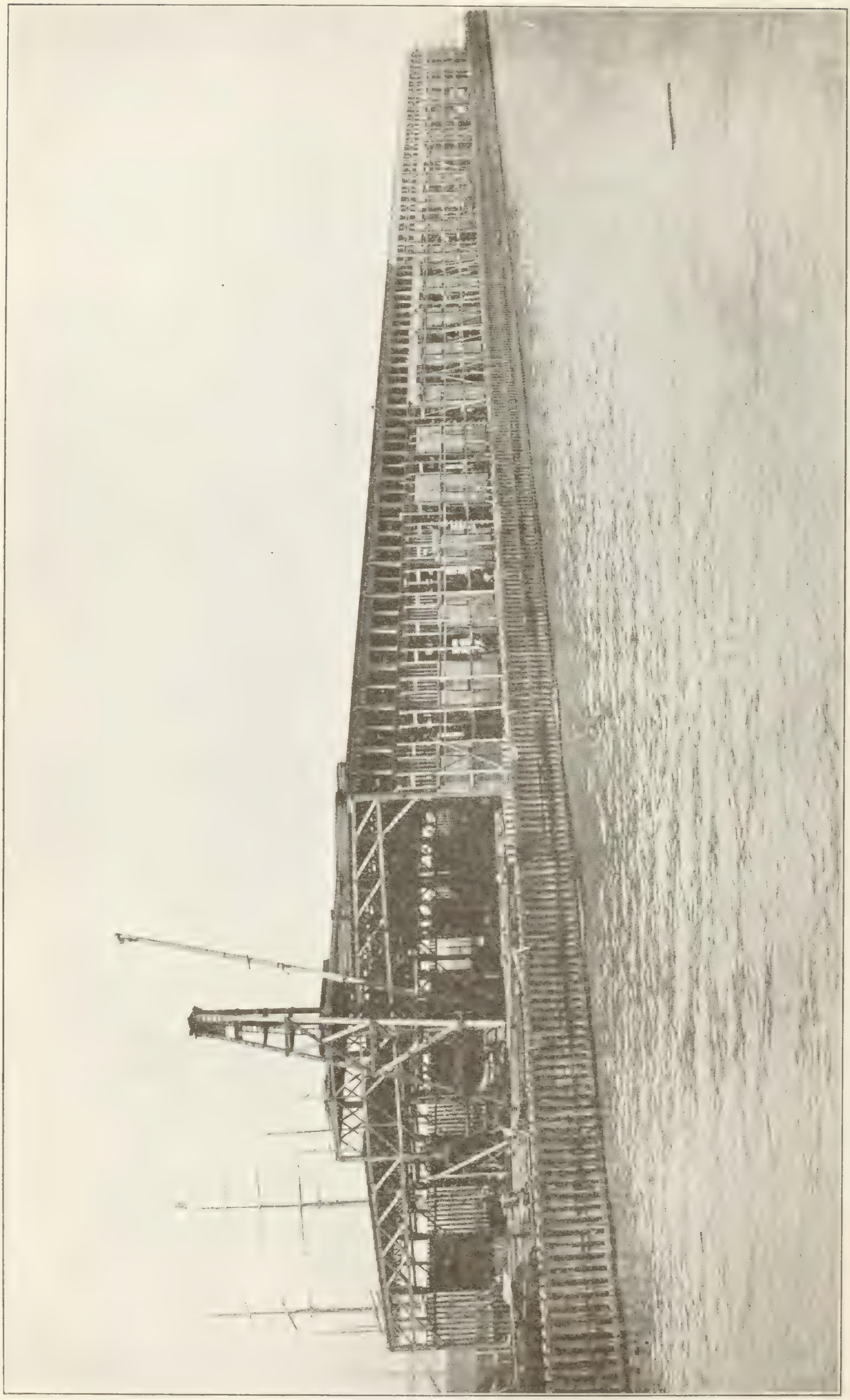
The present water front line of San Francisco in active use is approximately four miles in length. On June 30, 1916, there were in existence along this line 15,000 feet of completed seawall, 36 piers, and certain other smaller bulkhead and other wharves, 27 seawall lots of land, having a total area of approximately 941,786 square feet, of the value of about five million dollars, together with the tract of about 25 acres, leased for 50 years in the year 1900 to The Atchison, Topeka and Santa Fe Railway Company as its China Basin terminal.

The piers and bulkhead wharves offer about 12.7 miles of berthing space at the present time, and the system can be expanded, as the population and commerce demand, until it will cover quite 50 miles.

State Lands Adjoining.

By the progressive construction of a permanent seawall around the water front on the line fixed by law, important land areas between it and the previously existing city front have been reclaimed and become the property of the state and have been devoted to harbor uses.

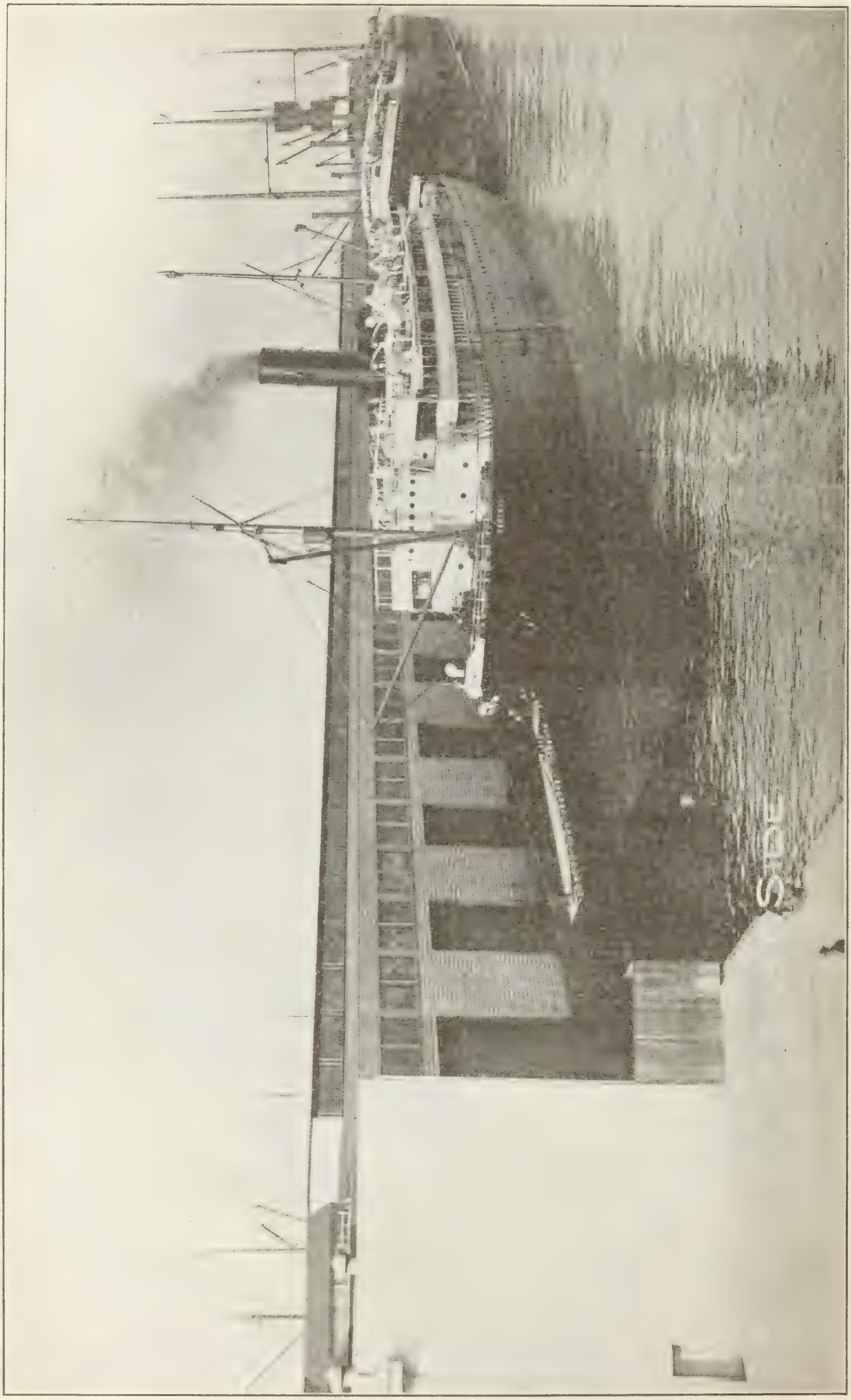
Many of these have been rented and leased to railroads and warehouses, etc., at remunerative figures, and some have been reserved for the use of the State Belt Railroad in its switching operations.



PIER 37. CONSTRUCTION OF SHED

PART I.

Report of the Board.



PIER 37. EAST SIDE

GENERAL CONDITION OF THE STATE WATER FRONT OF SAN FRANCISCO AND ITS ADMINISTRATION.

Development of Docking and Transporting Facilities.

During the past two years the work of extending and improving dockage facilities and the State Belt Railway switching system along the water front of San Francisco has progressed at a rapid pace, and the amount of new and additional facilities completed and elsewhere detailed makes an unprecedentedly large total.

Harbor Ready for the Opening of the Panama Canal.

The Panama Canal was thrown open to ships of a limited draught in July, 1914, and within less than a year thereafter to the largest ships, and it was especially gratifying that the large new business so confidently expected began to materialize almost immediately.

The great European war measurably halted this development, a number of the steamers familiar in this port having been soon drafted to other lines of trade by the war's demands.

However, the net growth of business, as shown by the statistics elsewhere detailed, must be regarded as very satisfactory.

The harbor was completely ready for the canal opening, and the march of improvement and expansion has been kept fully abreast of the increasing demand for new berths.

Nine Million Dollar Bond Issue Expended.

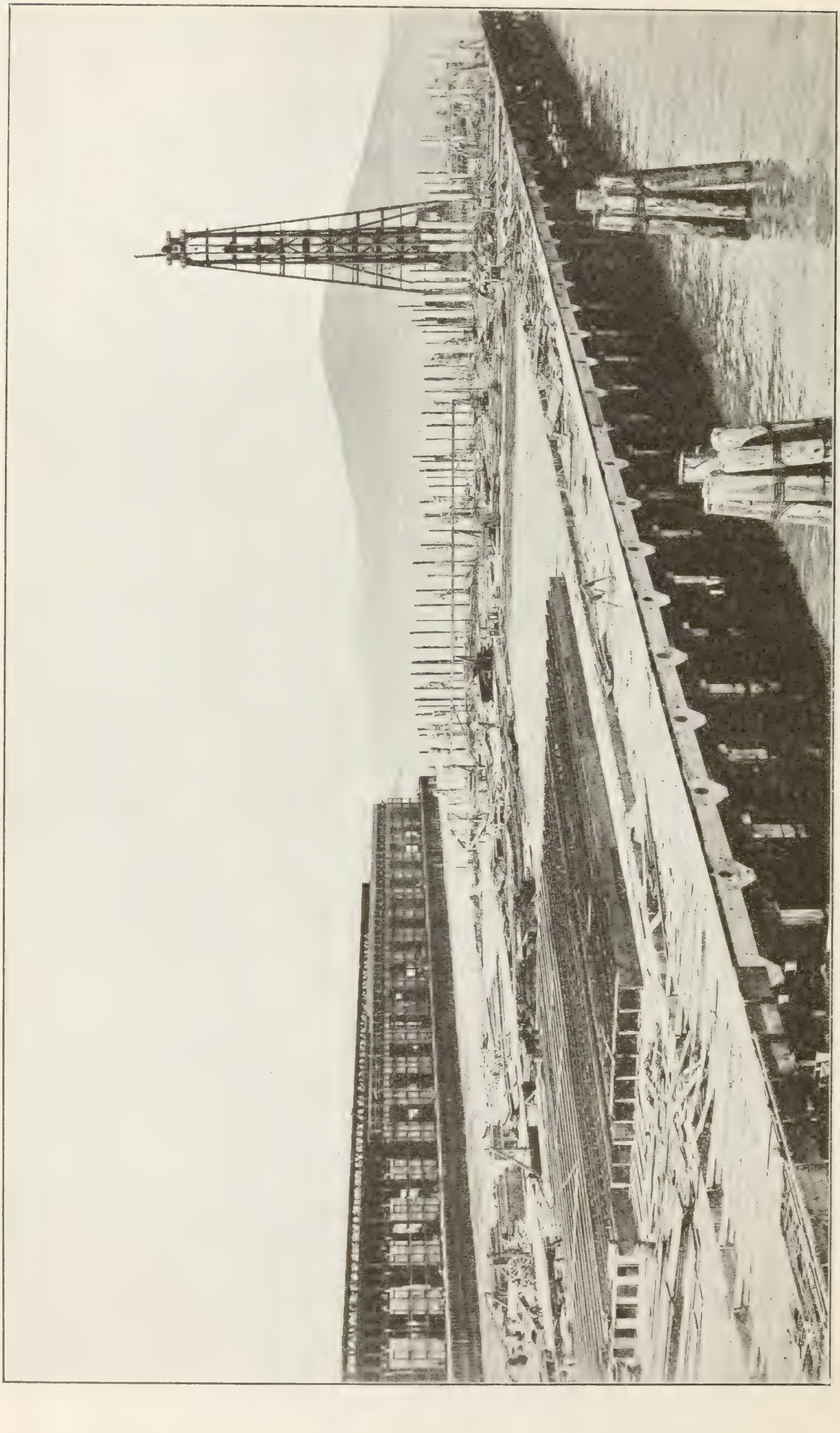
The state $9,000,000 bond issue, provided by the San Francisco Harbor Improvement Act of 1909, and which first became available in the year 1911, has during the past five years been almost completely expended in new and additional pier construction, belt line extensions, and other accompanying structures. A detailed statement appears in the secretary's financial statement.

Ten Million Dollar Bond Issue.

In our last report, mention was made of the fact that the legislature had provided for a further bond issue of $10,000,000 for harbor improvements for this port by the San Francisco Harbor Improvement Act of 1913. Since then this issue was authorized and approved by the people of the state at the general election in November, 1914. No part of this issue has yet been sold, but elaborate plans for additional construction already adopted will necessitate sales thereof as soon as the $9,000,000 issue is exhausted.

New Construction.

The immense amount and the character of new construction within the past two years is detailed in the accompanying report of the chief engineer of the board, and need not be repeated here.



PIER 35 DURING CONSTRUCTION

The Number of Piers.

The number of piers is now 36. Of this number 17 are wholly new, having been built by this board since 1911, out of the bond issue.

Of the remaining 19, which were in existence when this board took office in 1911, two will soon be demolished, being dilapidated beyond repair, ten have been largely reconstructed and seven are substantially as they were prior to 1911.

Eight of the new piers are north of Market street and nine south of Market street.

Increase of Wharf Area.

The increase in the number of piers does not alone give an accurate idea of the increase in wharf facilities. Two things are to be considered, the berthing length of the docks and the increased cargo area. The new piers are far larger than the old. The usual size of the old piers in width measured about 100 feet and in length about 600, whereas many of the new piers are 200 feet wide and from 800 to 1,000 feet long.

The wharf area of the piers still retained, which were in existence prior to 1911, when this board took office, is 1,817,231 square feet, and the wharf area of the new piers since then amounts to 2,185,729 square feet, an increase of 122 per cent.

New Piers Planned.

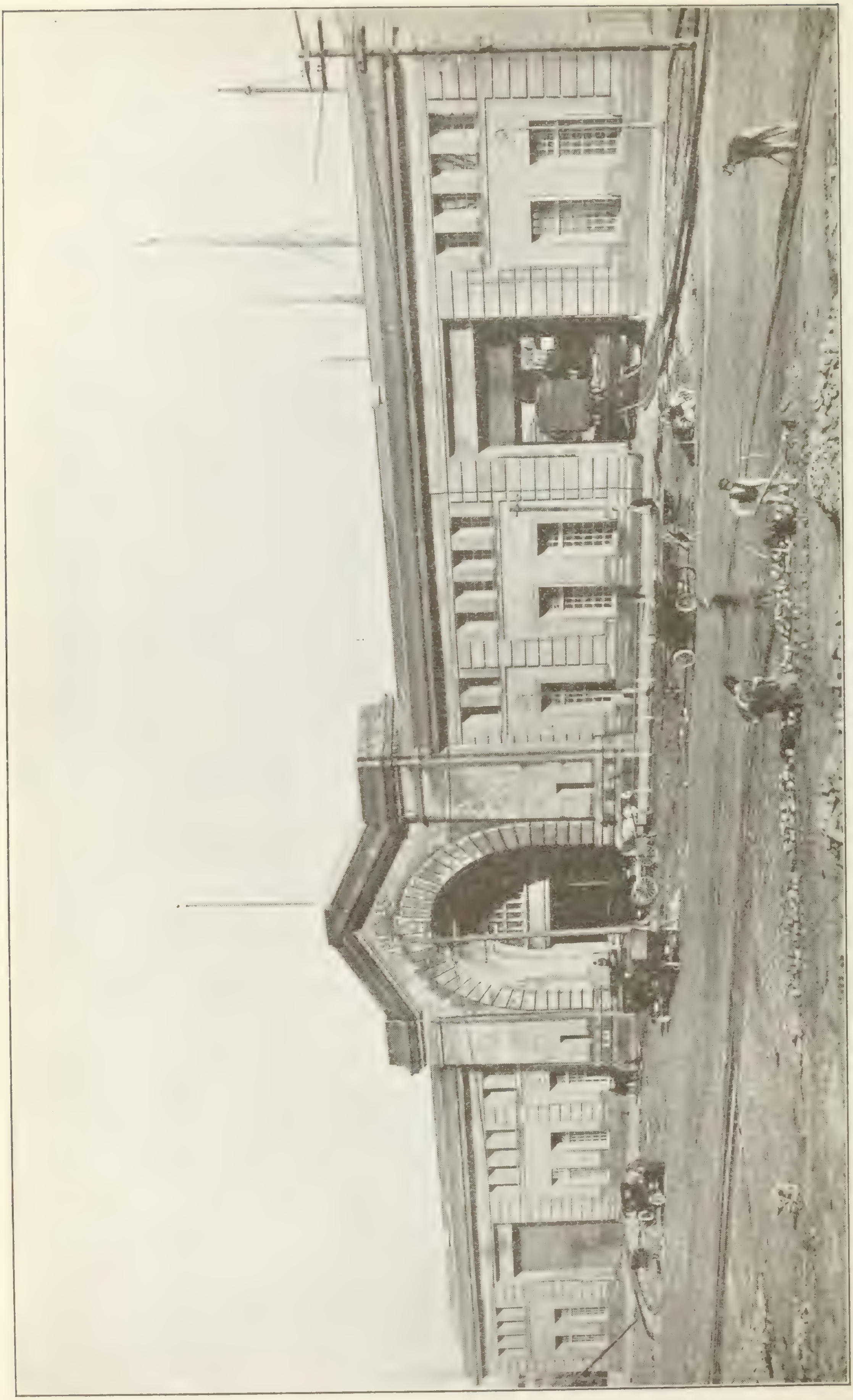
Plans are being perfected for five entirely new piers, as follows:

1. Pier No. 1—Next north of the Ferry Building, 550 feet long and 150 feet wide.
2. Pier No. 3—Next north thereof, 706 feet long and 138 feet wide.
3. Pier No. 31—At the foot of Francisco street, 800 feet long and 150 feet wide.
4. Pier No. 33—At the foot of Bay street, 800 feet long and 150 feet wide.
5. Pier No. 46—Near the foot of Berry street, 800 feet long and 200 feet wide.

Of these, Nos. 1 and 3 will take the place of existing piers 3 and 5, old and dilapidated beyond repair, and which will be entirely demolished; Nos. 31 and 33 will occupy new territory, and No. 46 will replace the pier of the same number, which was entirely destroyed by fire on the night of June 4, 1916, from causes unknown.

When this line is completed all available space for pier building north of the channel will have been occupied.

Further development must then go south of Channel street to the front of China Basin and the Islais Creek and India Basin lands and the water front line between.



BULKHEAD BUILDING. PIER 35

New Sections of the Seawall.

The only two remaining sections of the seawall in the district from Market street to Channel street, referred to in our last report, have since been completed.

New United States Post Office.

A new post office of concrete and brick has been completed by the harbor board for the United States Government, and its location on the water front behind the ferry slips and just south of the Ferry Building is so very advantageous that it has already become the main distributing post office of the city. The public, and especially the business, convenience of the city has been thereby so much promoted that 98 per cent of all the city mail now leaves this office.

Belt Railroad Switching System.

The development and extension of the State Belt Railway switching system have kept pace with pier development, and indeed have overrun it by a wide margin.

San Francisco undoubtedly now has the most complete harbor belt line railroad switching system in the country.

The railroad is located on The Embarcadero, a marginal thoroughfare 200 feet wide, located just behind the seawall, and the system is intended and is used to connect up, for the switching of freight cars, the various piers, the yards of other railroads, and private warehouses and industries generally.

The spur track permits for use on city streets fall under the jurisdiction of the municipal authorities, but the construction, maintenance and operation of the belt railroad around the water front are wholly under the jurisdiction of the board.

Bringing Ship and Rail Together.

As stated in our former report, few harbor improvements are more sought by all ports than the bringing of ship and railroad car close together, side by side, if possible, so as to promote dispatch and cheapness in transferring freight. This modern trend finds one of its best illustrations on the San Francisco water front.

Railway Spurs on Piers.

It has been the policy of the board not only to equip all new piers with spur tracks running the full length of the piers, but also, wherever the water slip spaces beside the old piers were sufficiently wide to permit of it, to widen existing piers and place spur tracks thereon.

Where there are tracks on both sides of the pier, the usual practice is to make one a surface track and the other is depressed so as to bring the floor of the railroad car on a level with the floor of the pier, thus facilitating trucking of certain classes of freight. Our practice is to accommodate the proposed tenants in this regard according to their preferences.

Center Tracks Found Inconvenient.

It was a practice of former boards to install railway spurs down the center of the pier. This was done on piers Nos. 34, 36, 38 and 40. But experience has demonstrated that the center arrangement is a mistake, because it interferes very seriously with teaming and trucking. The placing of the tracks along the sides of the piers, outside the sheds, is now universally demanded by shippers. This arrangement has been followed in all our constructions.

The center track on pier No. 38 has proved so inconvenient that we have recently widened the pier and put an additional track along the side.

A similar request has been made for pier No. 34, and that work may soon be undertaken.

Extension to the United States Transport Docks.

The completion of the belt line extension to the United States Transport docks at Fort Mason, through the concrete tunnel built by this board through the Fort Mason military reservation, was accomplished October 31, 1914, and was duly celebrated under the auspices of the United States Army authorities of the Pacific Coast division, at whose urgent request it was undertaken, as explained in our last report.

The service thereby given to the government for the transfer of all its freight destined for Hawaii and the Philippines and elsewhere has been of the greatest possible value.

A proposed extension of the line from the Transport docks to the Presidio military reservation, also suggested by the Army authorities for military uses, has been undertaken by this board and will doubtless soon be completed.

It is impossible to overestimate the value of this service to the Army. It is undoubtedly a long local step in the general scheme of preparedness, in which this board is very happy to have been of some assistance.

A Continuous Belt Railroad Around Harbor.

By these constructions and extensions, a continuous belt railroad switching system, adequately equipped, is now in full and successful operation around the whole active harbor front of San Francisco, from the United States transport docks on the north and west to Channel street on the south. It is a tremendous gain to the harbor, and its real advantages only become properly estimated when it is recollected that even such a great seaport as New York has no harbor belt line.

Increase in Belt Line Business.

The rapid extension of the belt line and the building of the connecting link between the north and south divisions across Market street have borne fruit in good measure. A comparison of the total revenues for the past three biennial periods will show at a glance the great increase in business:

Total revenue, July 1, 1910, to July 1, 1912	$320,412 90
Total revenue, July 1, 1912, to July 1, 1914	392,232 00
Total revenue, July 1, 1914, to July 1, 1916	571,687 00

It will be seen that the receipts for the biennial period just ended, July 1, 1916, exceed those of the preceding biennial period by 45.7 per cent, and exceed those of the biennial period ending July 1, 1912, by 78.5 per cent.

Bond Money Devoted to New Construction.

Although the terms of the bond act, which authorized the use of the money in betterments of all kinds, are sufficiently broad to warrant the board in using the bond money in making any harbor improvement, in its discretion, the board has consistently adhered to the policy of devoting the bond money exclusively to new constructions. All repairs and, indeed, much wholly new and additional construction work in new territory have been paid out of the current revenues, deposited in what is known as the "San Francisco Harbor Improvement Fund."

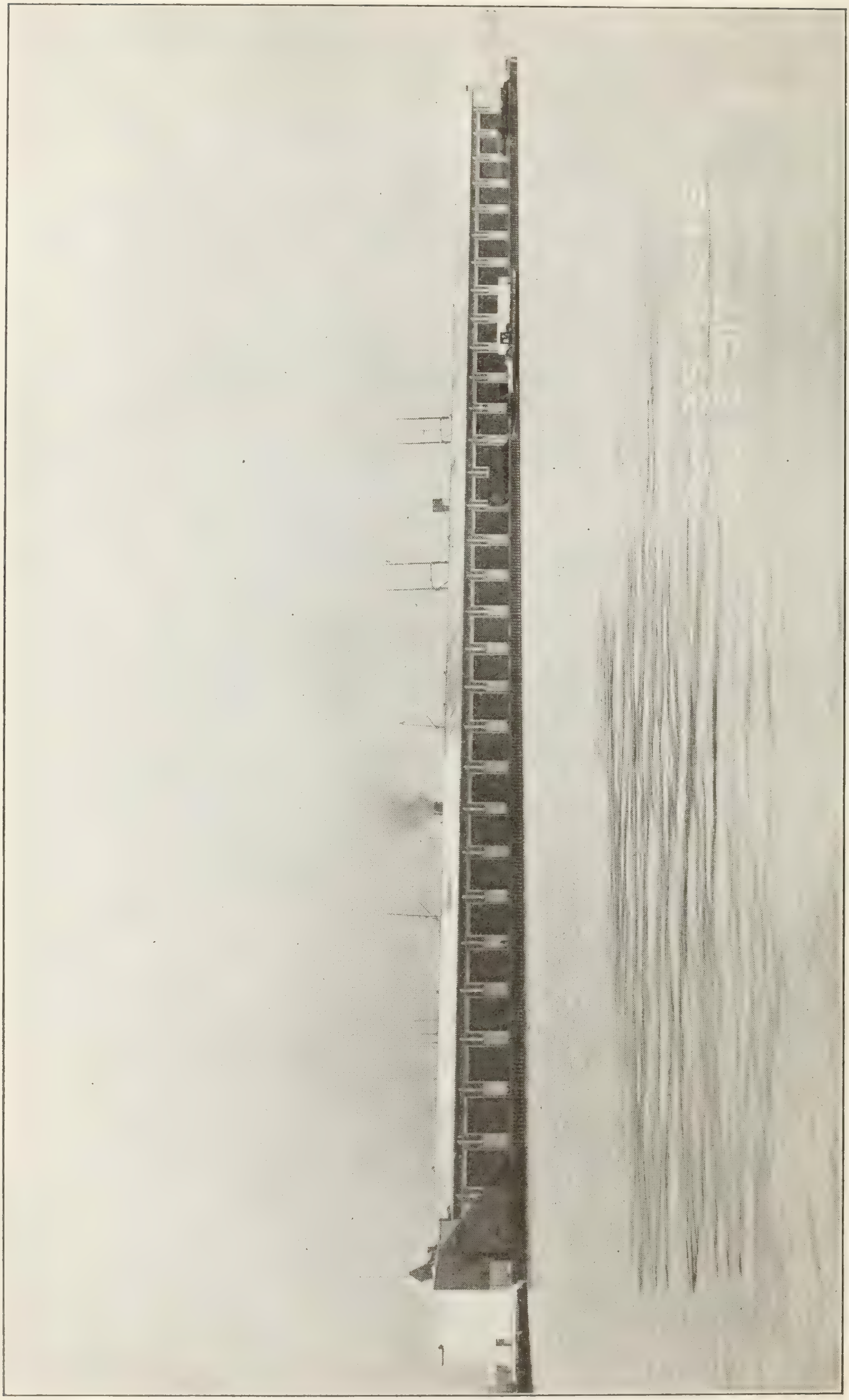
New Construction Paid for Out of Current Revenues.

The maintenance and repair bills of the harbor were paid out of the "San Francisco Harbor Improvement Fund," which is made up of current revenues, and in addition, out of the same fund, and not out of the bond money, the board expended for new and additional constructions the following:

For belt line trackage on lots 1 and 2	$25,093 90
For electric light extensions	28,844 81
For miscellaneous smaller improvements	19,118 94

Piers 21, 9, 11, 13, 44 were substantially rebuilt, the supports having practically all gone to pieces. The work done in this regard partook much more of the nature of new construction than repairs. The amounts expended on these works were also paid out of current revenues and were respectively as follows:

Rebuilding Pier 21	43,305 81
Rebuilding Pier 9	56,771 87
Rebuilding Pier 11	47,748 31
Rebuilding Pier 13	41,953 95
Rebuilding Pier 44	26,629 96
Total	$289,467 55



PIER 35. EAST SIDE

Repayment of Loan From the State.

As stated in our last report, owing to the financial stringency of 1913 and the competition with other public issues carrying a higher rate of interest, the State Treasurer found it impossible during that period to sell at par the harbor four per cent bonds of the nine million issue provided by the Act of 1909, and accordingly the legislature under the Act of June 16, 1913, came to our rescue by loaning to the Harbor Board not to exceed $500,000, to go as a commission on sale of the bonds, the loan to be wholly repaid to the state by the Harbor Board out of harbor revenues within five years, in equal yearly installments. By the aid of this commission, the State Treasurer was enabled to dispose of bonds to the amount of $4,767,000. The commission thereon amounts to $476,700, which will have to be repaid to the state at the rate of $95,340 per year; the harbor thereby being deprived of the means of making improvements out of current revenues to just that extent.

The financial reports of the secretary will show the present condition of this fund.

The installments of this loan due the state have been paid promptly as they fell due.

India Basin and Islais Creek Lands.

The suit for the condemnation of the Islais Creek and India Basin lands, begun by our attorney, as noted in our last report, has been tried in the superior court of the city and county of San Francisco, and is now under submission.

Drawbridge Over Islais Creek.

The steel drawbridge over Islais Creek on Kentucky street, the name of which has recently been changed to Third street, referred to in our last report, has since been completed and put in commission by the railroad companies interested.

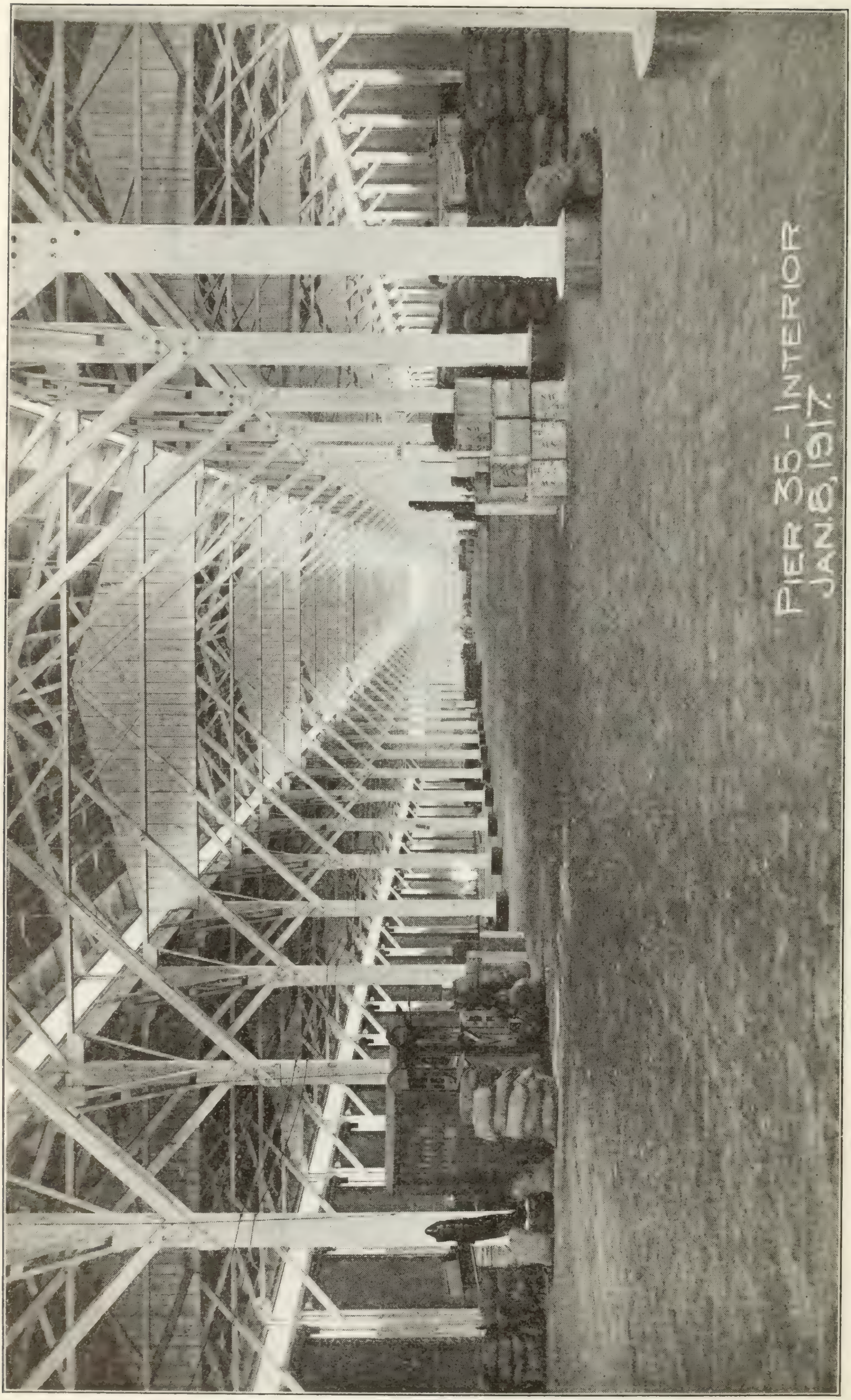
Fire Insurance.

The last legislature, in pursuance of the recommendation in our last report, increased the maximum of fire insurance permitted on harbor facilities from $700,000 to $1,200,000 and the additional amount has been duly placed.

Street Improvement.

Street improvements upon The Embarcadero and other neighboring streets under the board's jurisdiction have been vigorously prosecuted.

The most noteworthy novelty is that to accommodate the enormously increased automobile travel the board has decided to build a strip of smooth pavement of the most durable kind all around The Embarcadero, at least 30 feet wide. This work has been inaugurated and will be pushed to completion as fast as the alignment of the street on the water side has been progressively rectified.



INTERIOR OF SHED. PIER 35

The building of the new seawall and bulkhead in their true legally established locations has resulted in a very substantial and much-needed increase in the width of The Embarcadero, most of it from 15 to 45 feet, and over some notable stretches about 100 feet wider.

In view of the greatly increased traffic of the past five years, this widening has been of inestimable value. Without it, traffic would have been not only cramped but during certain rush hours would have been paralyzed.

Fortunately, the street is now wide enough not only to accommodate the demand for the smooth pavement above referred to, but to provide also a wide basalt pavement, which is required for the heavy horse-drawn vehicles, especially in damp weather.

Passenger Transportation Around Water Front.

Appreciating the need of improved passenger transportation around the water front, much of which is not reached by the street car systems of San Francisco, the board has given earnest study to the problem, and finally decided that the correct solution is an auto line of an improved type, to be owned and operated by the municipality of San Francisco, as a part of its new Municipal Railway system, with transfer privileges at the foot of Market street to the latter system, and, if it can be arranged, also to the system of the United Railroads.

A street car system on rails, either on the surface or elevated, will bear no comparison whatever with such an auto line, either in cost of installation or maintenance or operation, and the service could not be so good.

We forbear argument on the subject, as it will be thoroughly gone into in our meetings with the board of supervisors of the city and county of San Francisco, to whom we have made the recommendation.

The suggestion has been made that this board should build and maintain a street car system on The Embarcadero around the water front. This could not be entertained. Passenger transportation is clearly a city and not a state function, where the operation is to be public, and it can not be doubted that the streets under the jurisdiction of this board for merely harbor purposes are for all other purposes city streets as much as any other.

It was in recognition of this principle that the legislature in 1911 gave authority to the city and county of San Francisco to build and maintain a street car line on The Embarcadero, a permission which has not yet been availed of. (Stats. 1911, p. 284.)

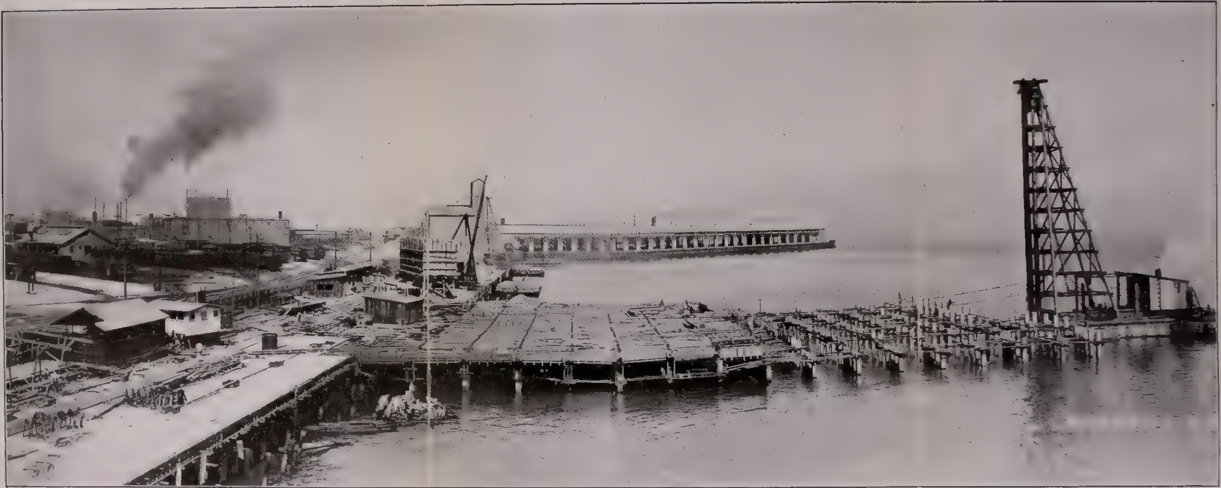
Wires Placed Underground.

In our last report, we stated that a beginning had been made in our plan to have all overhead wires of public utility companies, for telegraph, telephone, power and lighting purposes, placed underground. This work has been carried to completion. The improvement in the appearance of The Embarcadero is striking.

Lighting System Extended.

New electroliers of the handsome type designed for Market street, under city auspices, have been installed by the board in front of the Ferry Building, and other electric lighting extended to the limits of the active harbor. The harbor district is now one of the best lighted parts of San Francisco, whereas a few years back it was almost the worst, so bad, in fact, that travel after dark was exceedingly dangerous.

All the expense of constructing, maintaining, cleaning and lighting the harbor marginal street comes on this board.



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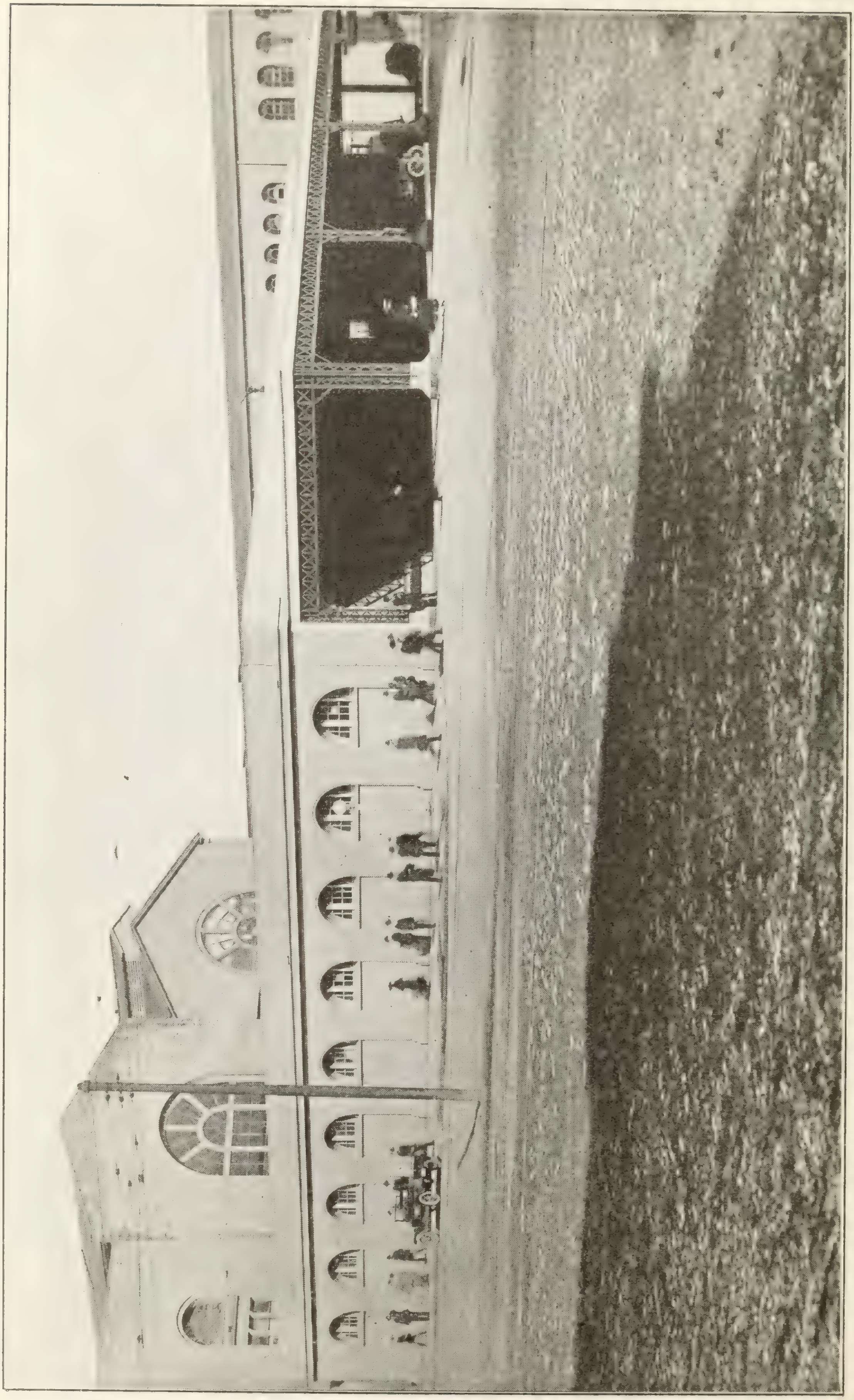
PIER 29 DURING CONSTRUCTION

PART II.

Report of the Chief Engineer.



FERRY BUILDING EXTENSION

REPORT OF THE CHIEF ENGINEER.

SAN FRANCISCO, July 1, 1916.

To The Honorable BOARD OF STATE HARBOR COMMISSIONERS,
San Francisco, California.

GENTLEMEN: Herewith I beg to submit my report as chief engineer of your board, for the term beginning July 1, 1914, and ending June 30, 1916.

As mentioned in my biennial report for the term ending June 30, 1914, there were under construction on the latter date the following structures, which are described in the report:

Section 9*a* of the seawall, which was 76½ per cent completed.

Section 9*b* of the seawall, for which a contract had been awarded, but on which work had not begun.

Pier 46, which was 46 per cent completed.

Pier 41, which was 21 per cent completed.

Pier 15, which was 6 per cent completed.

Repairs to Pier 19, which were 12 per cent completed.

Belt Railroad Extension to United States Army Transport docks at Fort Mason, which was 47 per cent completed.

Car ferry slips, which were 4 per cent completed.

Sewering and paving the southerly half of Bryant street between Main and Spear streets and the easterly half of Spear street from The Embarcadero to near Harrison street.

Sewering and paving The Embarcadero from Pier 34 to Pier 26, which was 2 per cent completed.

All of these contracts have been completed and the structures placed in service.

The various subdivisions of the work of the engineering department will be reported on separately, as follows:

1. Construction, piers and wharves.
2. Maintenance and repairs.
3. Belt Railroad.
4. Ferry slips and buildings.
5. Street work and maintenance.
6. Electrical department.
7. Dredging.
8. Testing department.

I. Construction.

Piers and Bulkhead Wharves.

Besides contracts for the construction of several new piers, a number of others were let for additions and improvements to existing structures in connection with repairs which were necessary to place them in good condition. The new piers are numbered 24, 22, 18, 16, 29, 35, and 37, the piers to which additions and improvements were made being numbered 44, 38, 12 (new number 20), 9, 13 (new numbers 7 and 11), 21.

New Piers and Extensions to Existing Piers.

Pier 24. This pier is 127 feet wide with a length of 800 feet. The substructure is creosoted piles, supporting a timber deck covered with asphalt in the cargo space and outside the shed, with a pavement of wood blocks in the driveway. There is a depressed track on the northerly side.

The shed is of timber, 98 feet wide by 790 feet long, with rolling steel doors, and has an elevated gallery for the use of passengers. The fender line is creosoted piling protected by untreated Oregon pine sheathing.

As in the case of all piers built in the last two years, the shed has an ornamental front, extending over and along the bulkhead, constructed of timber covered with cement plaster. This bulkhead building is 44 feet deep by 130 feet long.

Pier 24 was completed in September, 1915.

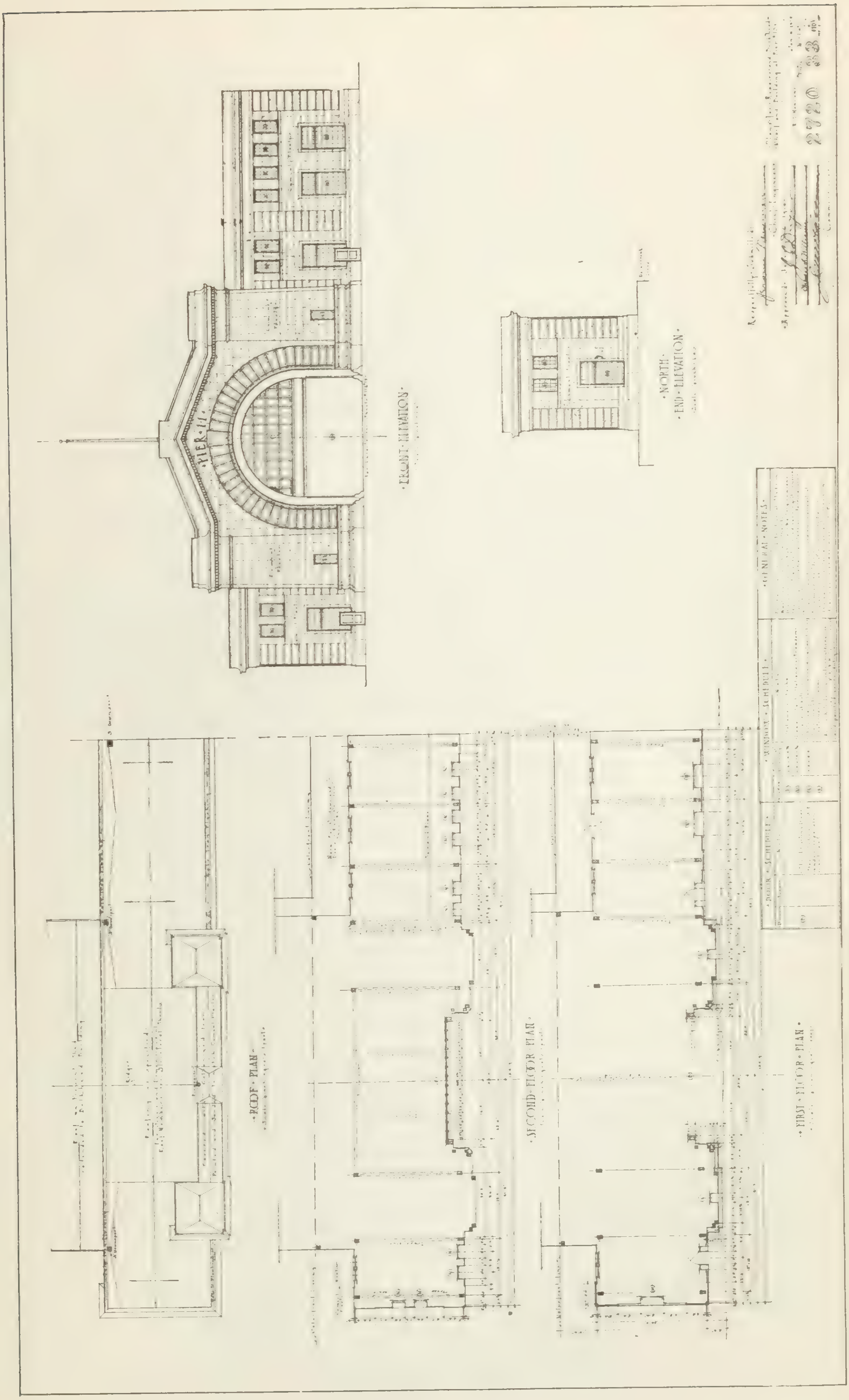
Pier 22. This pier is 125 feet wide by 407 feet long, the length being determined by the depth of water at the outer end; it is expected that the shoaling consequent on the construction of the piers in this vicinity will permit of its being lengthened in a few years, if required.

The substructure is creosoted piles with a timber deck covered with bituminous concrete and with a wood block driveway. There is a flush track on the northerly side. The fender line is similar to that on Pier 24.

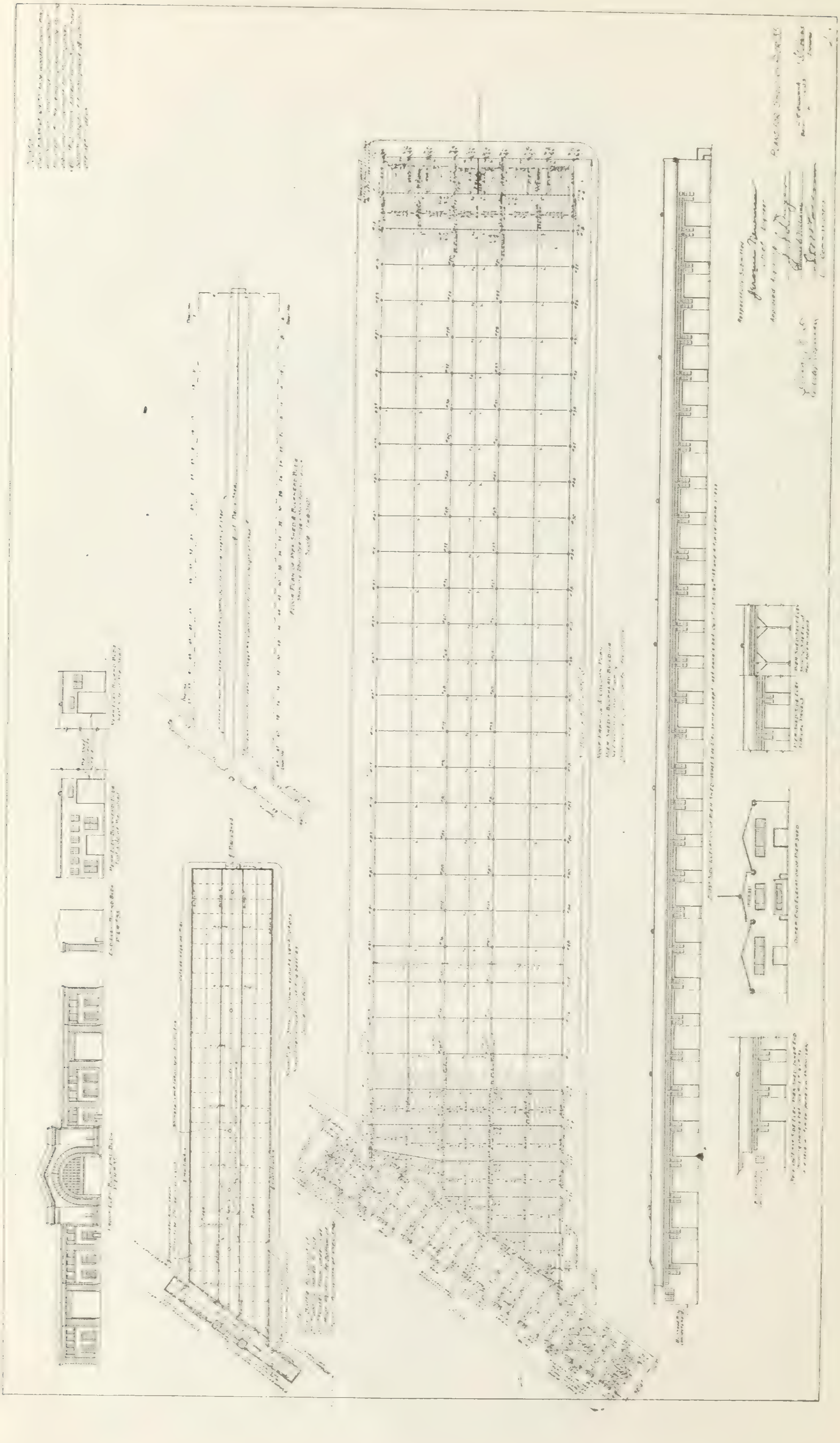
The shed is timber, 100 feet wide by 395 feet long, with a bulkhead building 44 feet deep and 130 feet long built of wood covered with cement plaster.

Pier 22 was completed in March, 1916.

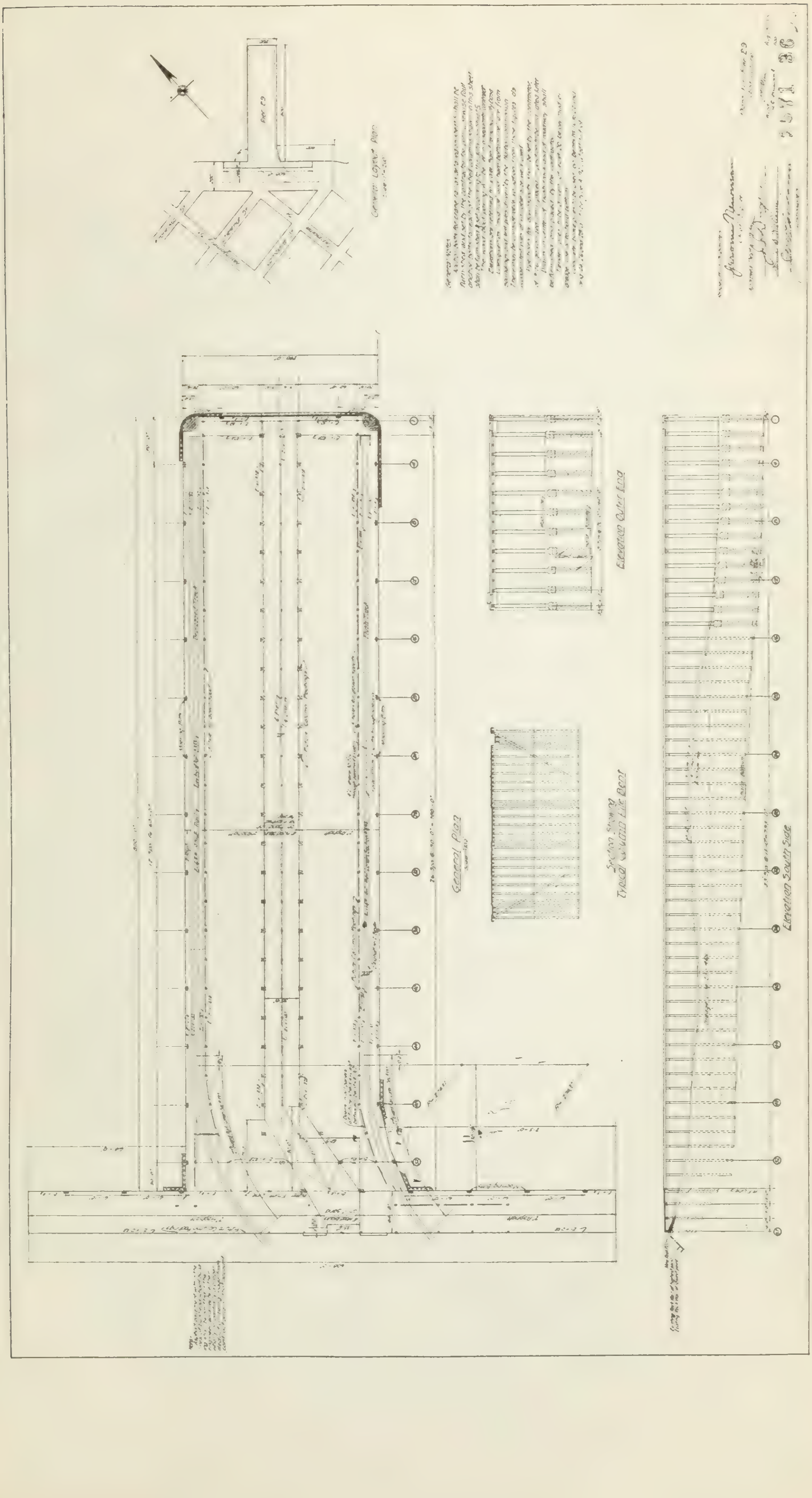
Pier 20 extension. In connection with the construction of piers 16 and 18 it was decided to lengthen Pier 20 (old number 12) in order to afford more berthing and storage space. A portion of the inner end of this pier had been removed to make room for the construction of section 9*b* of the seawall and after the extension had been completed the inner end was rebuilt and a new bulkhead building added of timber covered with cement plaster, uniform with the structure in front of piers 16 and 18.



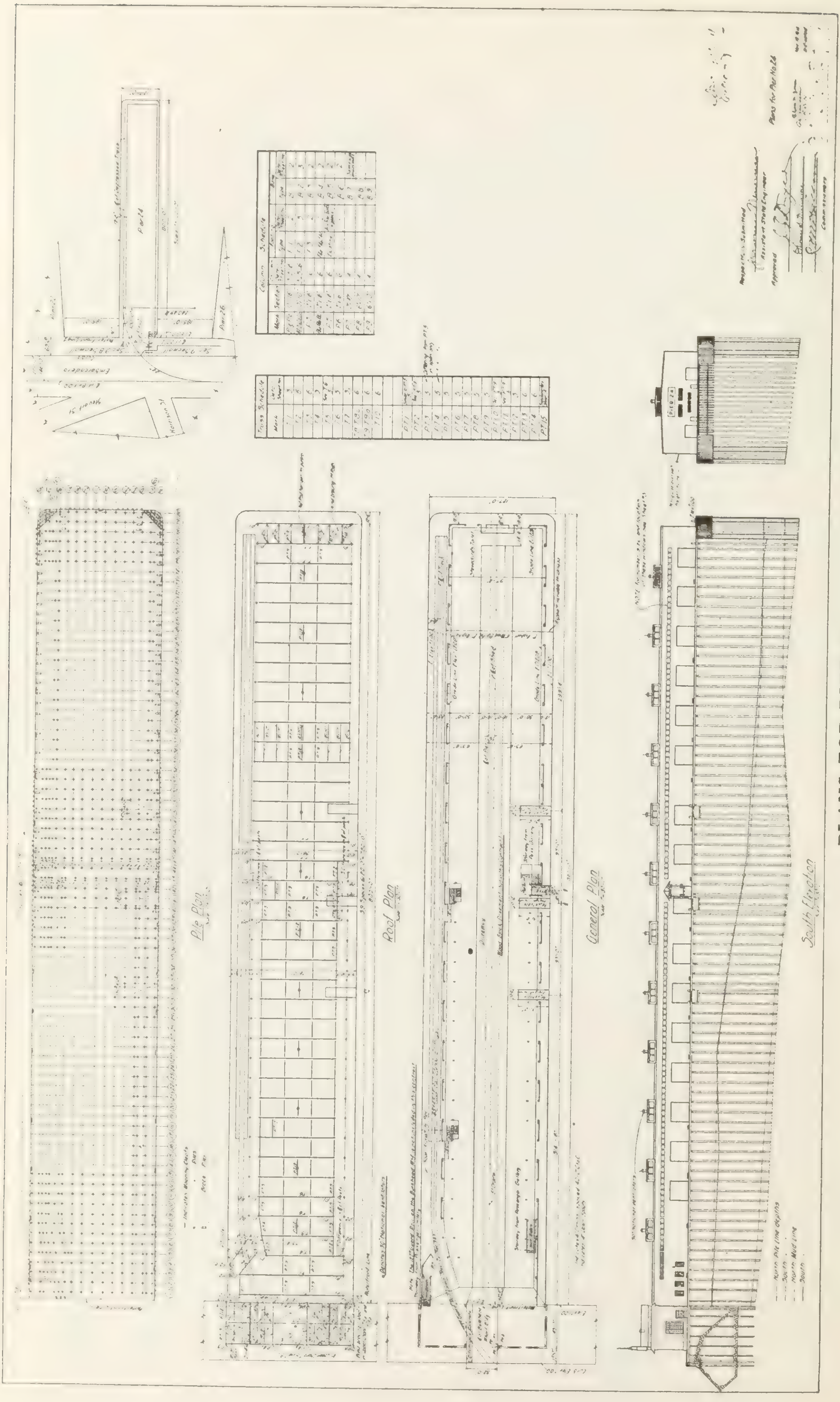
PLANS FOR BULKHEAD BUILDING ON PIER 13



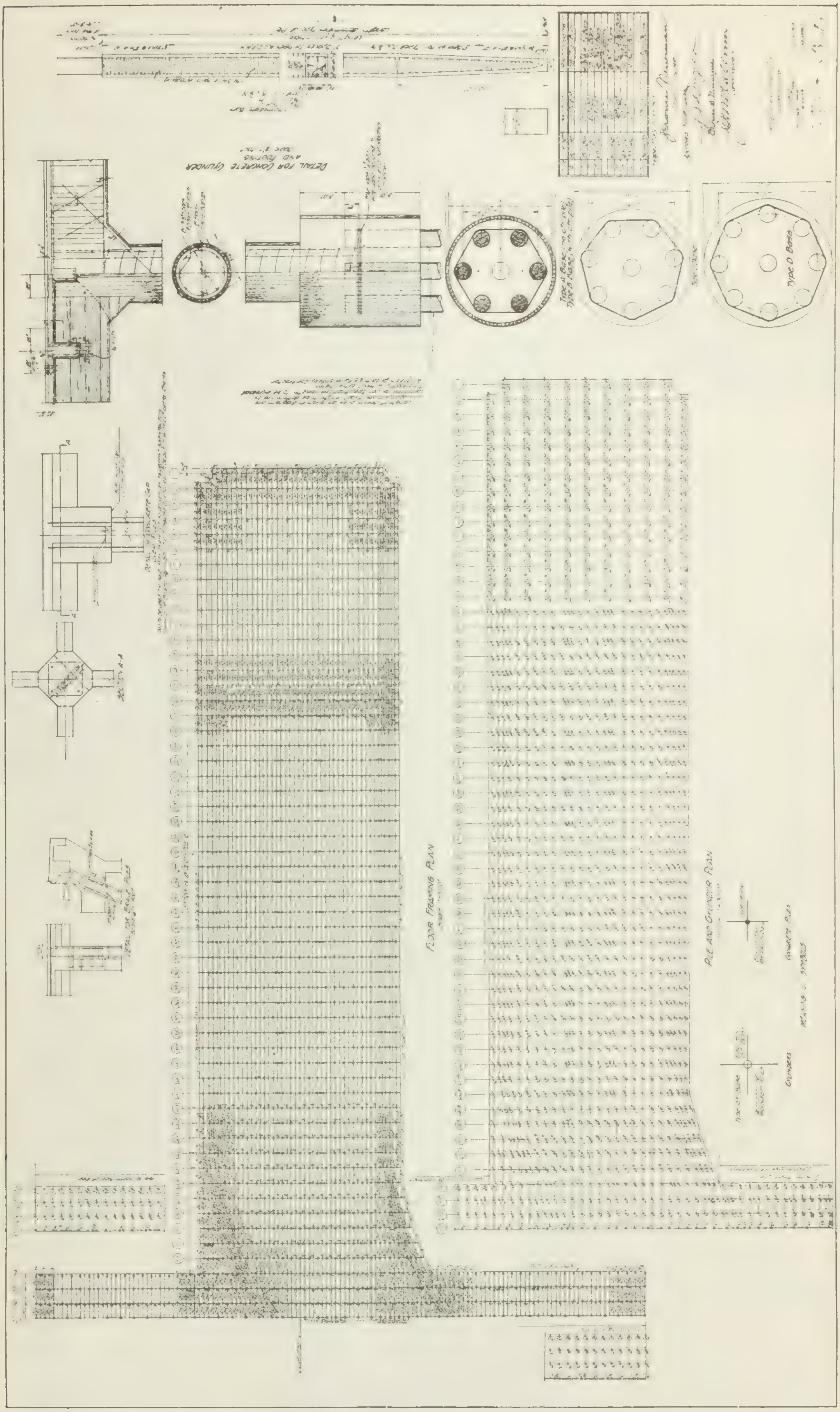
PLANS FOR SHED ON PIER 35



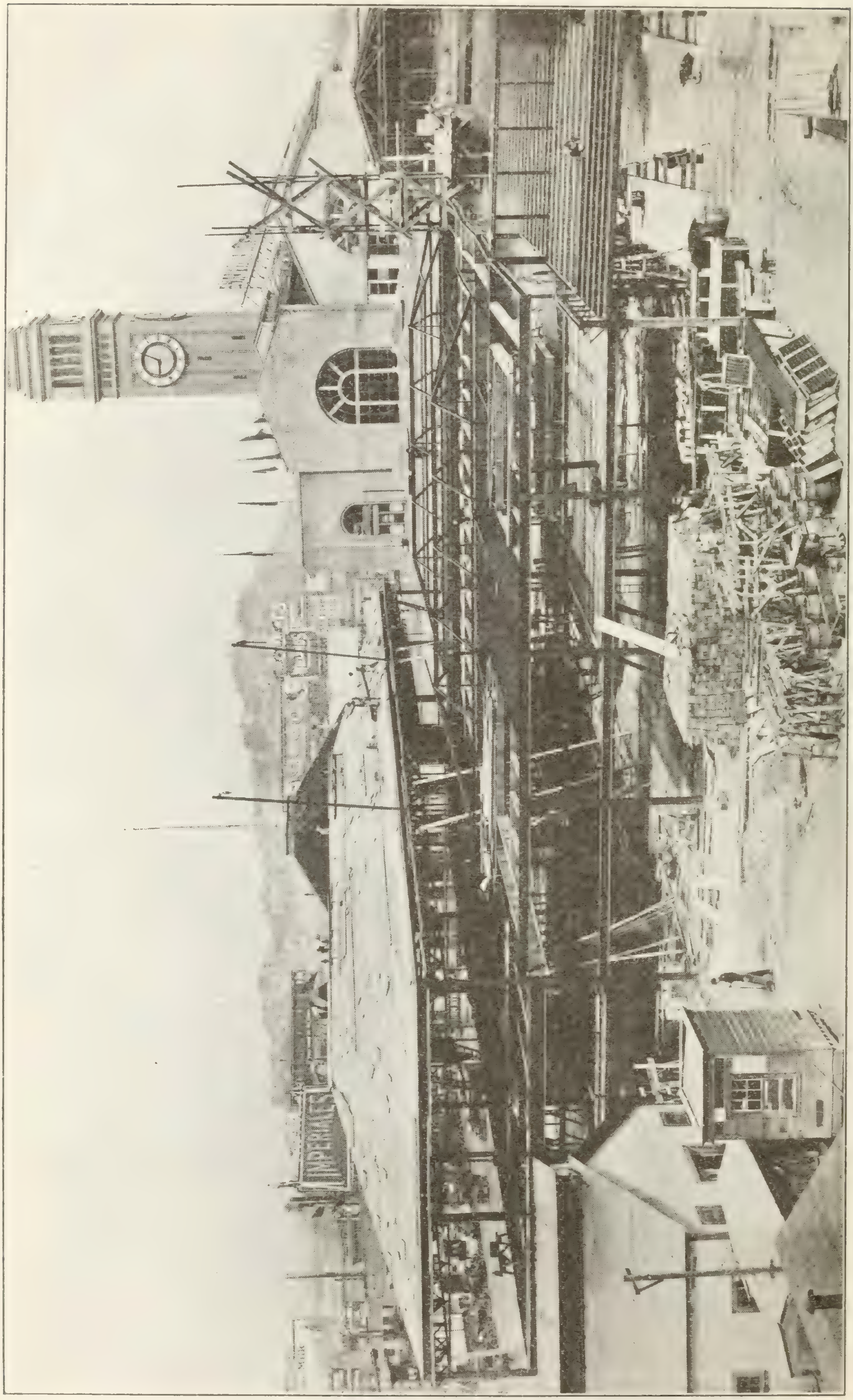
PLANS FOR PIER 29



PLANS FOR PIER 24



PLANS AND DETAILS FOR PIER 29



U. S. POST-OFFICE BUILDING DURING CONSTRUCTION

The extension is 111 feet wide by 72 feet long, with a creosoted pile substructure and wooden deck and driveway. The flush track on the northerly side was extended with the pier.

This extension was completed in December, 1915.

Piers 16 and 18. Although built under separate contracts, these piers may be considered as one structure, as they are similar in plan and have a continuous bulkhead building between them and extending to the southerly side of Pier 20.

Each pier is 140 feet wide by 686 feet long, and has a creosoted pile substructure carrying a wooden deck covered with asphalt except in the driveway, which is paved with wood blocks, and is provided with two tracks, the northerly one being depressed and extending the entire length of the pier and the southerly one being a short flush track. The fender line is the usual creosoted pile type with untreated Oregon pine protection.

The piers are arranged for convenient handling of coastwise freight and passengers in conformity with the wishes of shipping men. There are side aprons for handling freight, and elevated landing bridges leading to galleries for the use of passengers.

The sheds are timber, 101 feet wide by 680 feet long, with steel rolling doors. As mentioned above, there is a continuous bulkhead building, 41 feet deep by 773 feet long from the northerly side of Pier 16 to the southerly side of Pier 20, containing work rooms, waiting and baggage rooms and offices of the company to which the piers are assigned.

Pier 16 was completed in May, 1915, and Pier 18, in June, 1915.

Pier 29. This pier is 200 feet wide by 800 feet long. The inner 600 feet is supported on reinforced concrete piles, the outer 200 feet on account of the depth of mud, on concrete cylinders resting on timber piles. The deck is of the usual transverse girder, longitudinal beam and slab type, covered with asphalt, except in the driveway, which is paved with wood blocks. There are two tracks, one on each side, the northerly one being depressed and the southerly one flush. The fender line is creosoted pile with untreated Oregon pine sheathing.

In addition to the pier, the contract included the construction of a section of reinforced concrete bulkhead wharf, 44 feet wide and 608 feet long, extending each side of the pier. This bulkhead wharf is similar in type to that described in connection with Pier 39 in the last biennial report.

Plans for a shed are being prepared and will be ready for contract when the pier is completed.

Pier 29 was 68 per cent completed June 30, 1916.

Pier 35. This pier is 200 feet wide, with an average length of 896 feet. The substructure is reinforced concrete piles, carrying a reinforced concrete deck covered with asphalt, except in the driveway, which is paved with wood blocks. The northerly one of the two tracks is depressed, the southerly one flush. The fender line is similar in construction to that on Pier 29.

The construction of piers 35 and 29 presented some interesting problems in casting and driving reinforced concrete piles. The plans as originally prepared, called for 92-foot piles at the outer end, but before reaching this point, it was found that the unfavorable foundation required the use of longer piles and it was decided to substitute piles 106 feet long, 20 inches square and reinforced with eight one-inch bars. These very long and heavy piles, weighing 23 tons each, were successfully handled and driven and are believed to be the longest piles of this kind ever used.

The shed is timber, 160 feet wide and 900 feet long, covered with asbestos-protected metal, which material was selected on account of its fire-resisting qualities, and is fitted with steel rolling doors. There is a bulkhead building in front of the shed, 33 feet deep and 316 feet long, constructed of timber covered with cement plaster.

The contract for the pier included a section of reinforced concrete bulkhead wharf, 45 feet wide and 494 feet long, similar in type to that built at Pier 29.

Pier 35 was completed in June, 1916.

Pier 37. This pier is 200 feet wide, with an average length of 937 feet. It has a creosoted pile substructure carrying a wooden deck covered with asphalt with a wood block pavement in the driveway. There are two tracks, the northerly one being depressed, the southerly one flush. The fender line is of the standard creosoted pile type, similar to those on piers 29 and 35.

The shed is timber, 160 feet wide and 940 feet long, provided with steel rolling doors. There is a bulkhead building 33 feet deep by 348 feet long, of timber covered with cement plaster.

The contract for this pier also included the construction of a reinforced concrete bulkhead wharf 45 feet wide and 607 feet long of the same design as that used at Pier 29.

Pier 37 was completed in June, 1915.

Additions to Existing Piers.

Pier 44. In connection with the repairs to this pier which will be described under ''Maintenance and Repairs,'' a new bulkhead wharf building 32 feet deep and 147 feet wide is to be constructed. This building is to be of timber, covered with cement plaster.

This addition was 5 per cent completed on June 30, 1916.

Pier 38. The center track originally built on this pier having proved unsatisfactory, it was decided to replace it by a depressed track on the northerly side. This required the construction of an addition, 20 feet wide and 540 feet long, supported on creosoted piles, carrying a timber deck, covered with a seal coat of hot asphalt and coarse sand and having the standard creosoted pile fender line.

This addition was 2 per cent completed on June 30, 1916.

Pier 7 (old number 9). In connection with the repairs to this pier, a new bulkhead wharf building, 30 feet deep and 300 feet long, was constructed; this is timber covered with cement plaster. To adapt the pier for coastwise traffic, new cargo aprons, passenger bridges and an elevated gallery were also added.

A reinforced concrete bulkhead wharf, 44 feet wide and 363 feet long, was built under the same contract as the bulkhead wharf building; this wharf is of the same type as the one at Pier 29.

The addition to Pier 7 was 85 per cent completed on June 30, 1916.

Pier 11 (old number 13). Under the contract for repairing this pier, extensive additions were made, consisting of an extension to the shed, a bulkhead wharf building, a depressed track on the northerly side and a section of reinforced concrete bulkhead wharf.

The old shed which covered only the outer half of the pier, was extended over the inner half for 416 feet and a timber bulkhead wharf building 30 feet deep and 126 feet long, covered with cement plaster was added.

The addition for the depressed track is 18 feet wide and 800 feet long; the substructure is creosoted piling, carrying a timber deck covered with bituminous concrete.

The concrete bulkhead wharf is 44 feet wide and 363 feet deep and similar in design to the one at Pier 29.

These additions were 50 per cent completed on June 30, 1916.

Projected Work.

Plans for new work are in course of preparation as follows:

Track and addition to Pier 40, to replace the present center track; these are 90 per cent completed.

Pier 3 to replace present Pier 5, with adjacent bulkhead wharf, 50 per cent completed.

Bulkhead wharf buildings at new Pier 3; these are 30 per cent completed.

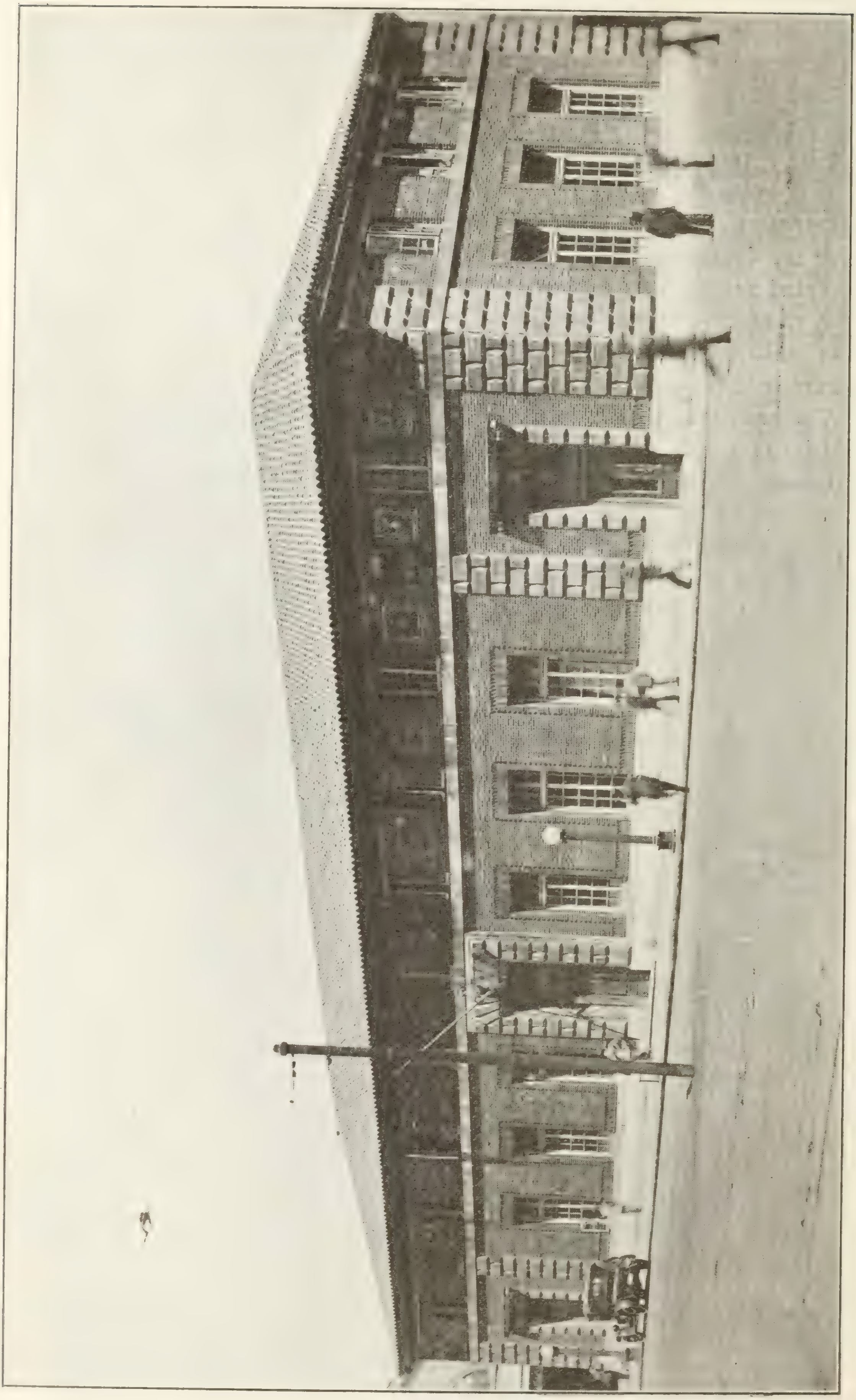
Shed on Pier 29; these are 5 per cent completed.

Pier 31, north of Pier 29; these are 10 per cent completed.

Bulkhead wharf between piers 29 and 31; these are 5 per cent completed.

Bulkhead wharf buildings at piers 29 and 31; these are 10 per cent completed.

Extension of southerly dolphin of car ferry slips; these are completed and ready for contract.



U. S. POST OFFICE. FERRY STATION

2. Maintenance and Repairs.

In accordance with the practice of the board, the ordinary repairs to piers, wharves and slips have been made by the state force. Several contracts were let for large repair jobs on various piers, together with additions to these structures, which latter have been described under the head of "Construction."

The piers to which repairs were made by contract are Nos. 44, 7 (old number 9), 9 (old number 11), 11 (old number 13), 19, 21, and 23. Of these, Nos. 44, 7, 11, 13, 19, 21, and 23 are concrete cylinder piers, built by the old method of depositing concrete in water, and were in bad condition. The repairs to these piers were made by taking down and removing the defective cylinders and replacing them with creosoted piles, which will insure a further useful life of about 15 years. Pier 9 is a creosoted pile structure, and the repairs were made by driving the necessary new piles.

In all cases, the decks were repaired at the same time as the substructure and, where possible, were covered with asphalt or bituminous concrete.

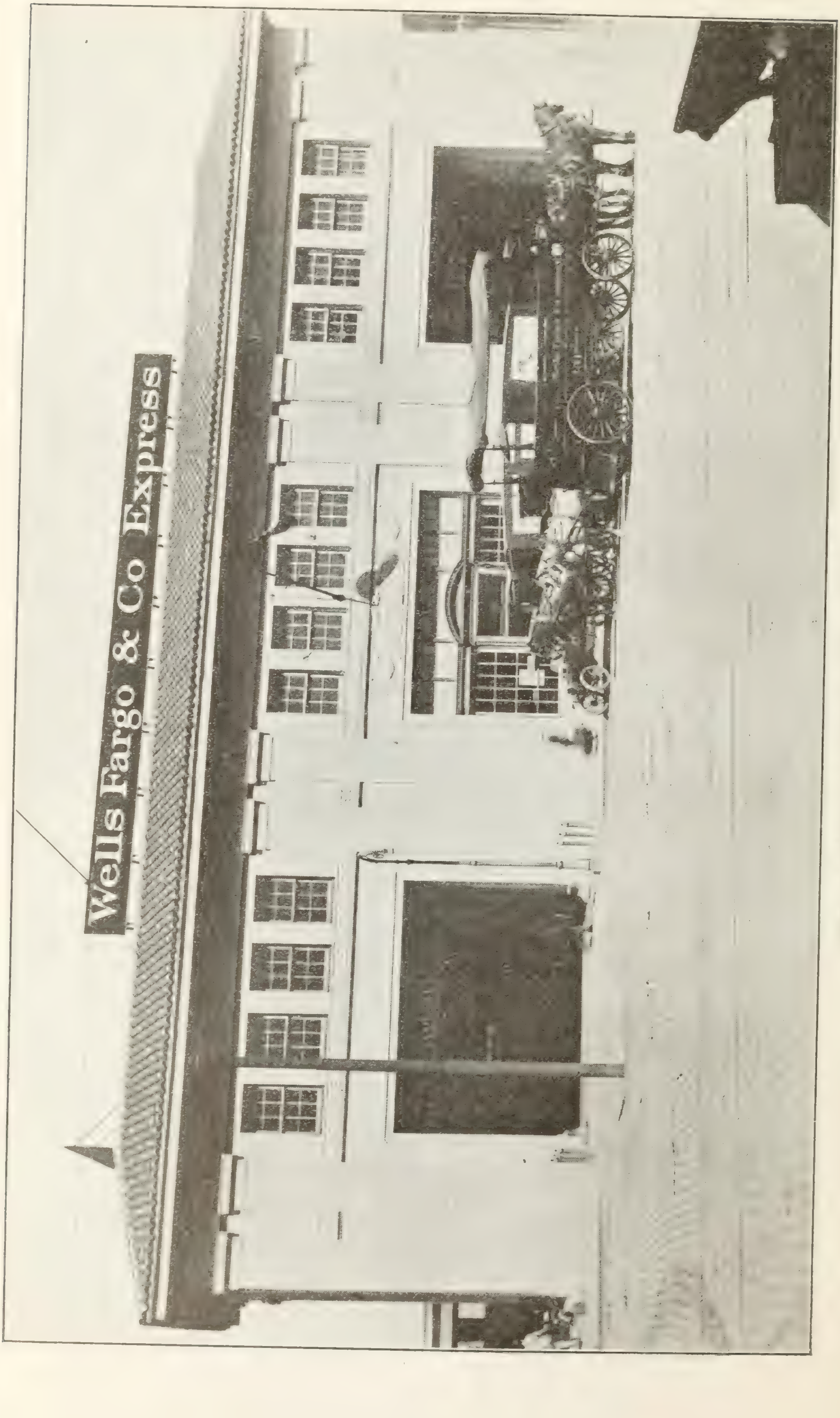
The cylinders supporting the main and side aprons in Ferry Slips 1 and 2 were examined by divers and found to be in a dangerous condition. These cylinders were of the old type and plans for replacing them with concrete piles have been completed and arrangements made to have the work done partly by state forces and partly by contract.

The steel rolling doors on piers constructed some years ago are in need of repainting, and contracts are to be let for cleaning and repainting them as opportunity offers.

3. Belt Railroad.

Owing to the increased mileage and consequent large amount of traffic on the Belt Railroad, the work of maintenance has become heavier, and the track-laying force has been busily employed. In addition to ordinary maintenance, numerous turnouts have been laid to new piers and new tracks built on existing piers when requested by the tenants. As mentioned in the last report, all piers of sufficient width are provided with two tracks, one surface and one depressed, those not wide enough for two tracks having only one. Latterly the occupants of piers have shown a decided preference for depressed tracks, and it would seem that this type should be considered standard, to be departed from only on the request of the user.

The extension to the Transport docks was completed October 29, 1914, and has been rendering good service since that date. The federal government is considering an extension of this line, and negotiations for right of way have been begun.



WELLS FARGO & COMPANY EXPRESS BUILDING

4. Ferry Slips and Buildings.

Passenger Slips 7, 9, and 10, described in the last report, were completed as planned in January, 1915.

The car ferry slips also described in the last report were completed in December, 1914.

The buildings described, viz: Ferry Building extension, post office, and Wells, Fargo and Company's building have also been completed, as follows:

Ferry Building extension in February, 1915.
Post office in August, 1915.
Wells, Fargo and Company's building in May, 1915.

The Ferry Building extension which contains baggage rooms used by the Southern Pacific and the Western Pacific was very useful during the Exposition period in taking care of visitors, and the post office now handles practically all mail for the business section, saving time in collection and delivery and expense in distribution.

In addition to the buildings enumerated above, several others have been constructed for various purposes, as follows:

A fire house for the use of the San Francisco fire department, located on the bulkhead wharf between Piers 22 and 24. This is a two-story timber building, 38 feet by 62 feet in size, covered with cement plaster and containing a garage for a motor-drive fire engine with living and sleeping rooms for the company. This building was completed in April, 1915.

A building for the use of the launch companies, located on the bulkhead north of Pier 16 and containing storerooms and offices. This building is 20 feet by 164 feet in size, is constructed of timber and covered with cement plaster. It was completed in March, 1916.

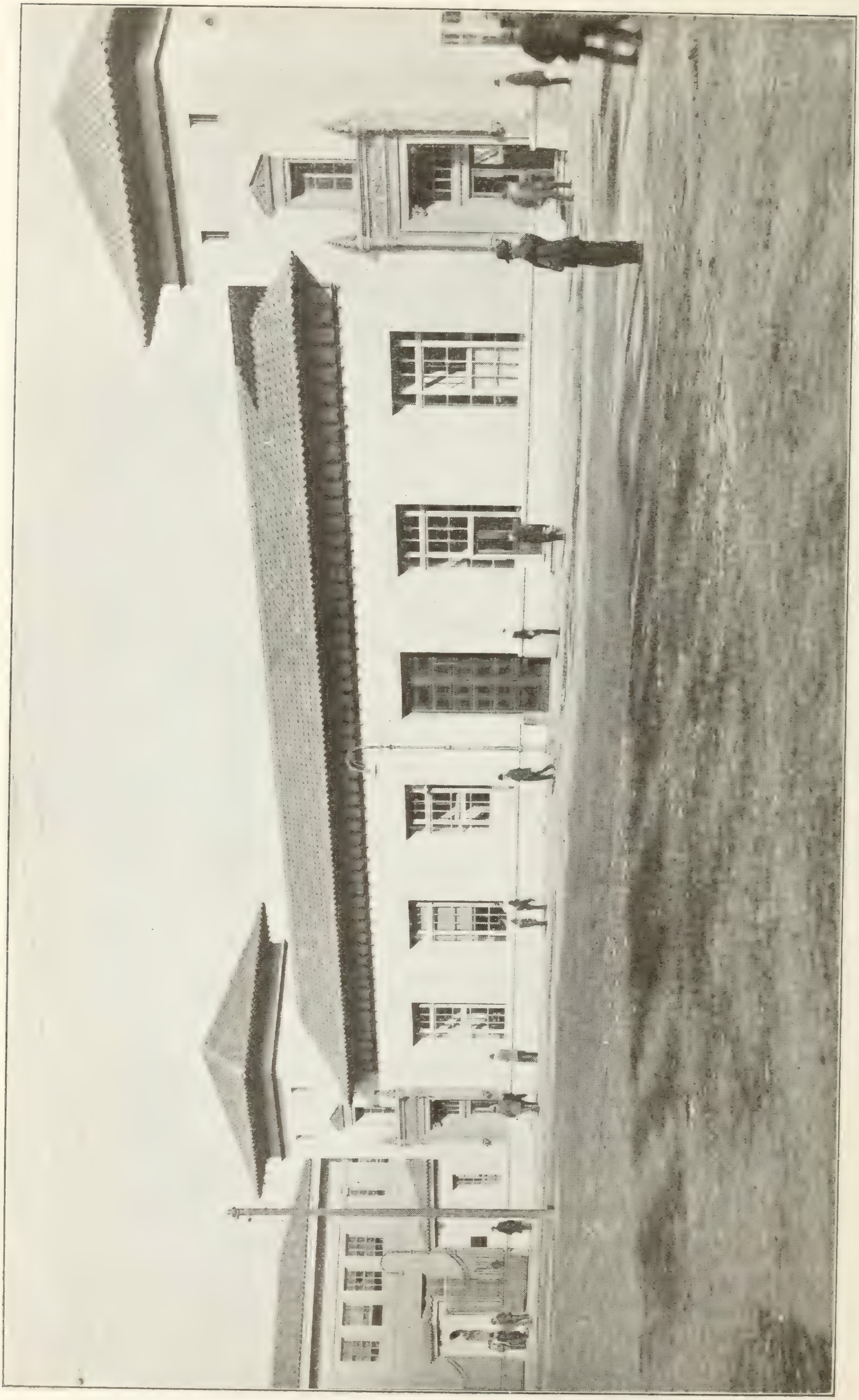
A small ticket office for the Southern Pacific Creek Route ferry, 21 feet by 30 feet in size, of timber covered with cement plaster. This was completed in January, 1916.

A timber shed for the American Express Company on the dolphin between Slips 9 and 10. The front portion is 60 feet by 100 feet, the rear, 65 feet by an average width of 82 feet. This was completed in August, 1915.

5. Street Work and Maintenance.

On account of the increase in vehicular traffic during the last two years, the paving force has been extremely busy on repair work. In addition to this, a considerable amount of new work has been done by contract, as follows:

Sewering and paving the southerly half of Bryant street between Main and Spear streets and the easterly half of Spear street from The Embarcadero to near Harrison street, mentioned in the last report. This was completed in November, 1914.



LAUNCH OFFICES

Sewering and paving The Embarcadero from Pier 34 to Pier 26, also mentioned in the last report. This was completed in September, 1914.

Paving the approaches to The Embarcadero on Main and Fremont streets, completed in November, 1914.

Laying an asphalt sidewalk from Pier 3 to Pier 13, completed in December, 1914.

Paving Jefferson street between Leavenworth and Hyde streets, completed in April, 1915.

Paving that portion of The Embarcardero between Market and Folsom streets reclaimed by the construction of the seawall and laying a concrete sidewalk to south of the post office. To provide for settlement, the pavement was constructed of bituminous macadam, the intention being to replace it with permanent material when the subsidence has stopped. This work was completed in December, 1915.

Paving The Embarcadero between Brannan and Harrison streets, completed in February, 1916.

Laying an asphalt sidewalk on the east side of Sansome street, between Lombard and Chestnut streets, completed in January, 1916.

6. Electrical Department.

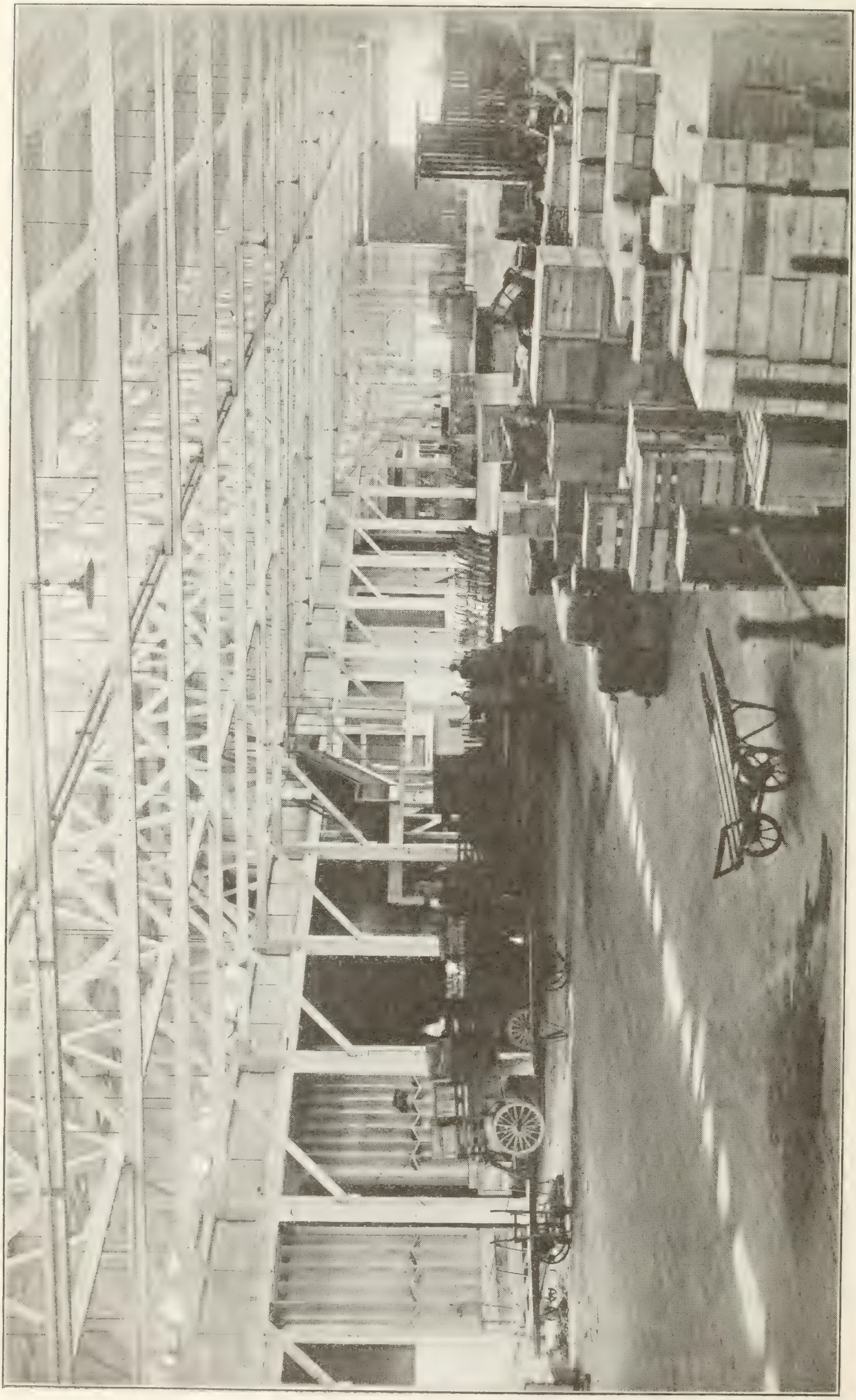
The electrical department during the past two years has been continuing the work of extending the underground system of state wires, both for lighting and signal purposes.

The electric lighting system along The Embarcadero has been extended from Pier 22 northerly to the Ferry Building, and from Pier 27 northerly to the car ferry slips at the foot of Mason street; 25 additional electroliers have been installed between Pier 22 and the Ferry Building and 30 are being placed north of Pier 27. When the installation of the latter is completed, there will be a continuous line of high efficiency electroliers, 140 in number, from Channel street to Mason street, directly controlled from the central switchboard in the Ferry Building.

Pier illumination has been greatly improved by the substitution of the new nitrogen lamp for the old style Mazda type, and Piers 24, 22, 20, 18, 16, 9, 35, and 37, the post office, Wells Fargo and Company's building, American Express Company's office, launch offices and the fire house have been wired.

The lighting of the Ferry Building, which was quite unsatisfactory, has been bettered by the introduction of a system of indirect lighting, which has also been installed in the post office and other buildings in the vicinity.

The underground conduit system for Harbor Commission wires, which is planned between Channel and Mason streets, has been extended to Pier 11 from Harrison street, conduits are now being placed in Sections 2 and 3 of the seawall, and the section from Pier 11 to Mason street is about 75 per cent completed.



INTERIOR OF SHED. PIER 16

In conformity with plans adopted some years ago, all poles and overhead wires, with the exception of those owned by the street railroads, have been placed underground.

Twenty-two new fire boxes have been authorized and are being installed on The Embarcadero; these are connected with the fire alarm system of the city.

A new system of 39 fire alarm boxes has also been installed in the Ferry Building, and is to be connected with the city's system.

The remote control system has been enlarged to include all street and pier lighting between the Channel and Mason streets.

Tugs and Dredgers.

Besides the routine work of dredging, this department has been engaged in pulling piles at the sites of new piers before and after completion.

As mentioned in the last report, the equipment, owing to its age, entails excessive cost of maintenance, which is growing larger yearly, and the time will soon arrive when, as a matter of economy, its replacement should be considered. This is particularly the case with scows at present in use, some of which are 30 years old, and have been in service continuously.

Testing Department.

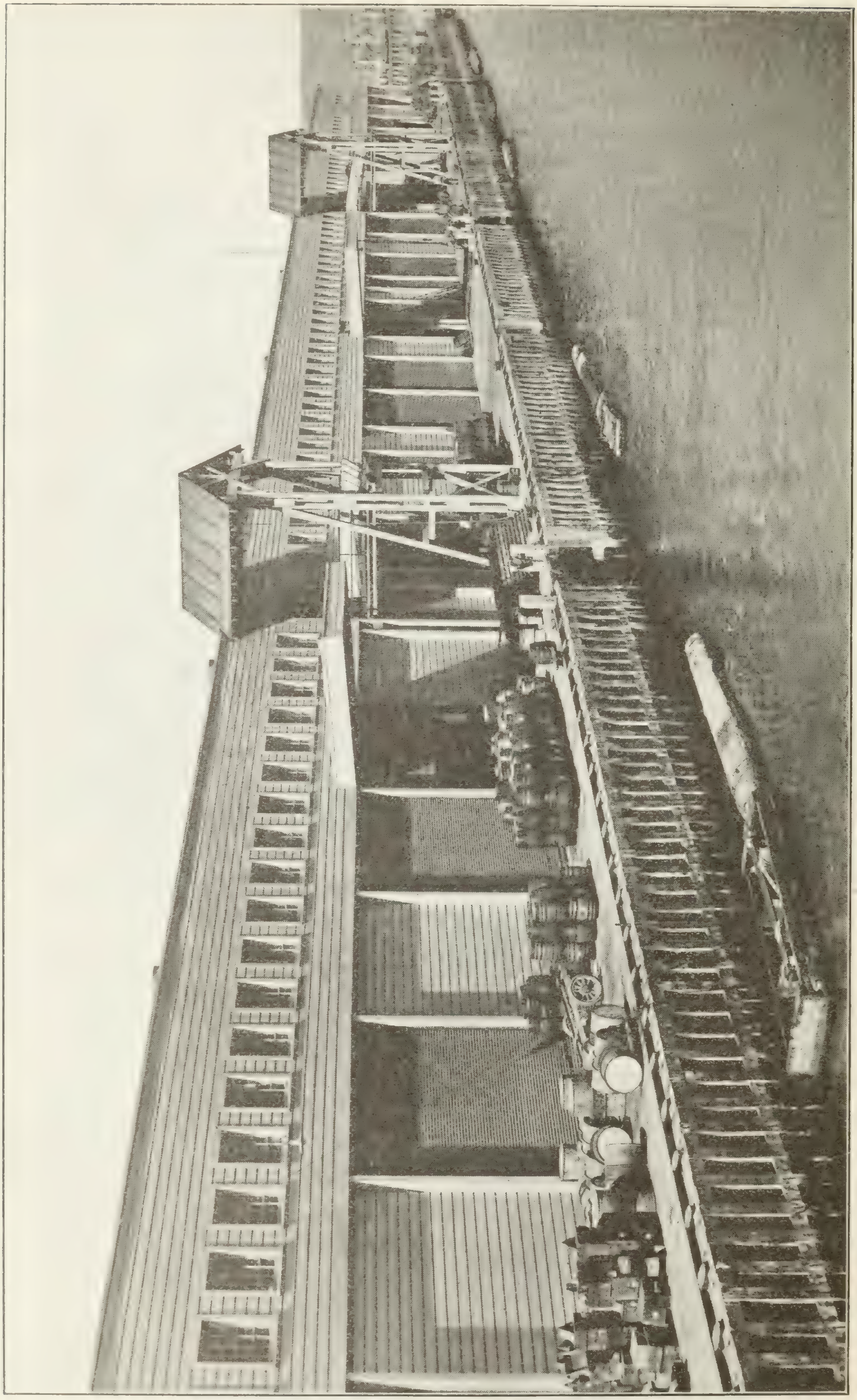
Since the last report, the testing laboratory has increased in size and equipment. The installation of the 150,000-pound machine has rendered possible the physical testing of all structural metals, concrete, brick, etc., in addition to which the local shop inspection of structural steel has also been handled.

An important part of the work of this department has been the investigation of asphaltic cements, asphaltic concrete, prepared roofing, saturated felts and paints for structural steel, wood and concrete. The work of the department along these lines has saved the state many thousands of dollars, and it would be extremely unwise to curtail this work, as proposed, by the reduction or elimination of the force employed.

In addition to the regular work of the Harbor Commission, numerous tests have been made for the State Department of Engineering and the Highway Commission; these tests have been made without charge, and have been of material assistance to the two departments.

Respectfully,

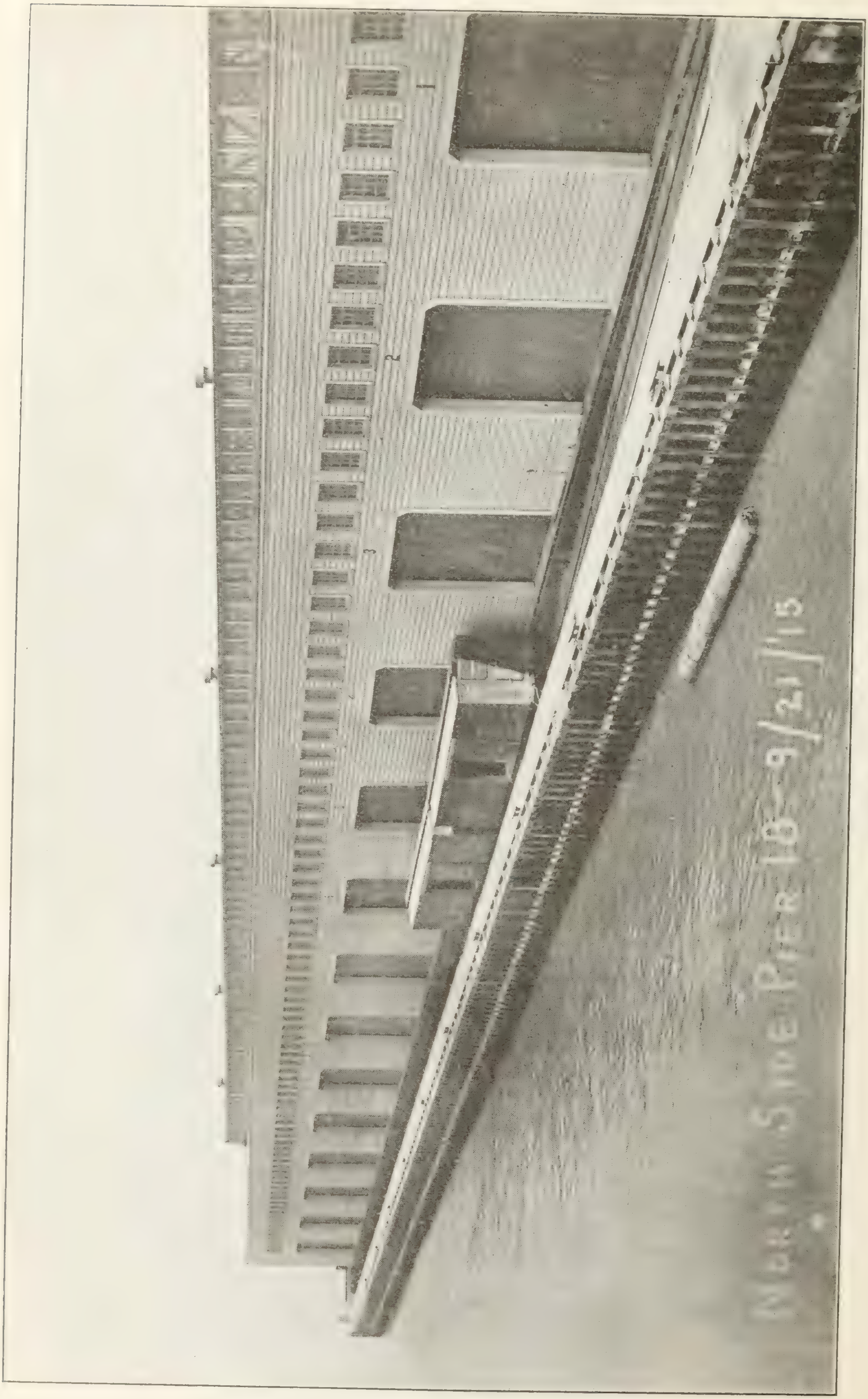
JEROME NEWMAN,
Chief Engineer.



PIER 16. SOUTH SIDE

PART III.

Report of the Attorney.



PIER 18. NORTH SIDE

REPORT OF THE ATTORNEY.

SAN FRANCISCO, July 1, 1916.

To The Honorable, THE BOARD OF STATE HARBOR COMMISSIONERS.

GENTLEMEN: Herewith please find my report from the first day of July, 1914, to date.

During that time I have submitted to the board 16 written opinions and have rendered many verbal ones. I have drawn 53 contracts, involving a total sum of $2,106,688.25, exclusive of the amounts contracted to be paid for oil, lumber, street cleaning and electric light and power.

I make the following report on actions to which your board was party:

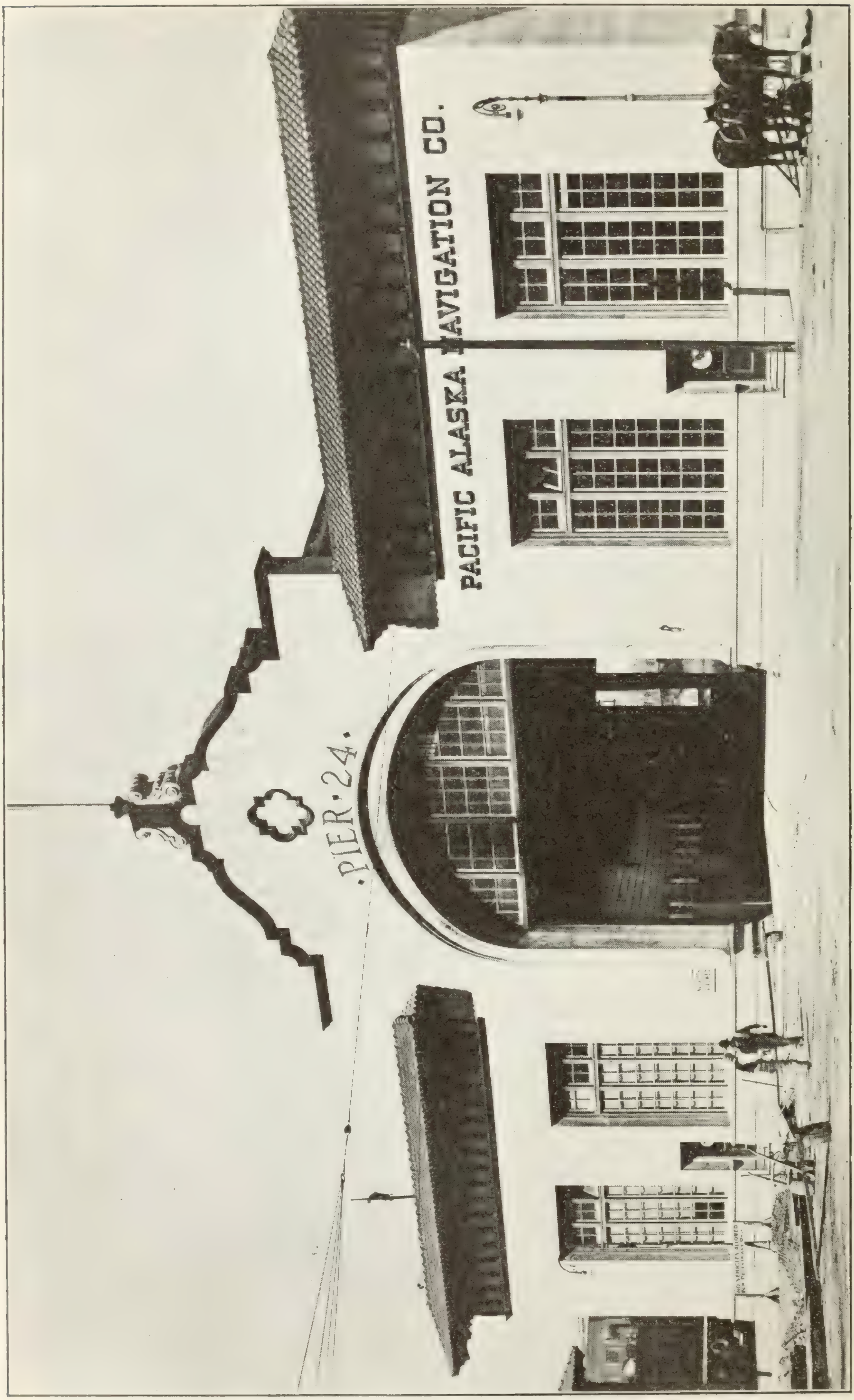
1. *Henry Cowell Lime and Cement Company* vs. *State of California and the present members of the Board of State Harbor Commissioners.* Action brought in the superior court to enjoin the board from entering upon 12 feet claimed by the plaintiff as the easterly line of its property at Market street and The Embarcadero, and claimed by the board to be a portion of the westerly line of The Embarcadero. The board has answered and filed a cross complaint in ejectment and the action is still pending.

2. *Johan Alfred Matsson* vs. *State of California and members of the present and former Board of State Harbor Commissioners as such members and individually.* An action to recover $35,533.00 on account of the death of plaintiff's son, caused by his being struck by a train of cars on the Belt Railway. The case was disposed of by the legislature appropriating the sum of $1,000.00, which was paid to the plaintiff.

3. *People of the State of California, ex rel. Board of State Harbor Commissioners* vs. *Southern Pacific Company, a corporation.* Three separate actions in ejectment to recover possession of five parcels of land on the northerly side of Channel street between Fifth and Sixth streets. A motion for nonsuit was granted by Judge G. A. Sturtevant and the cases are now pending on appeal taken by your board to the supreme court of the state of California.

4. *People of the State of California, ex rel. Board of State Harbor Commissioners,* vs. *Gray Bros. Crushed Rock Co., and the Ætna Indemnity Company of Hartford, Conn.* On October 28, 1913, judgment was rendered in the superior court in favor of the board and against the said defendants. The Ætna Indemnity Company is insolvent. On November 17, 1913, a claim on the judgment was presented to the receiver in insolvency at Hartford, Conn., supplemental to the claim that was presented prior to the judgment. No dividend has yet been declared by the receiver.

5. *People of the State of California, ex rel. Board of State Harbor Commissioners,* vs. *145 defendants, being owners of individual parcels*



PIER 24

of land constituting property north of India Basin and extending to Islais Creek. An action in condemnation, now under submission to Judge Seawell for decision.

6. *W. A. Brown* vs. *Board of State Harbor Commissioners.* An action for reinstatement to the office of wharfinger. Judgment was rendered in favor of the board, from which judgment the plaintiff appealed, and the supreme court finally disposed of the matter by sustaining the judgment of the lower court.

7. *People of the State of California, ex rel. Board of State Harbor Commissioners,* vs. *Russell J. Coggeshall, Geneva C. Curtis, H. D. Curtis, J. J. Roche, Mary A. Junge, Hans Christian Junge, The Atchison, Topeka and Santa Fe Railway Co., Christine Catherine Luhrs Webster, Walter B. Webster, Samuel W. Holladay, Georgiana C. O. Holladay, Ord Preston, Robert N. Risdon, City and County of San Francisco, George W. Junge, Union Trust Company of New York, and Central Trust Company of New York.* An action to condemn four parcels of real property at Harrison and Spear streets. Judgment in condemnation was obtained and the total damages assessed at $58,597.95, which amount was paid to the several owners according to their interests, and deeds obtained from them, recorded and, together with the policy of title insurance issued by the Title Insurance and Guaranty Company, sent to the Secretary of State, to be kept in the archives of his office. The property involved now constitutes part of The Embarcadero in the vicinity mentioned.

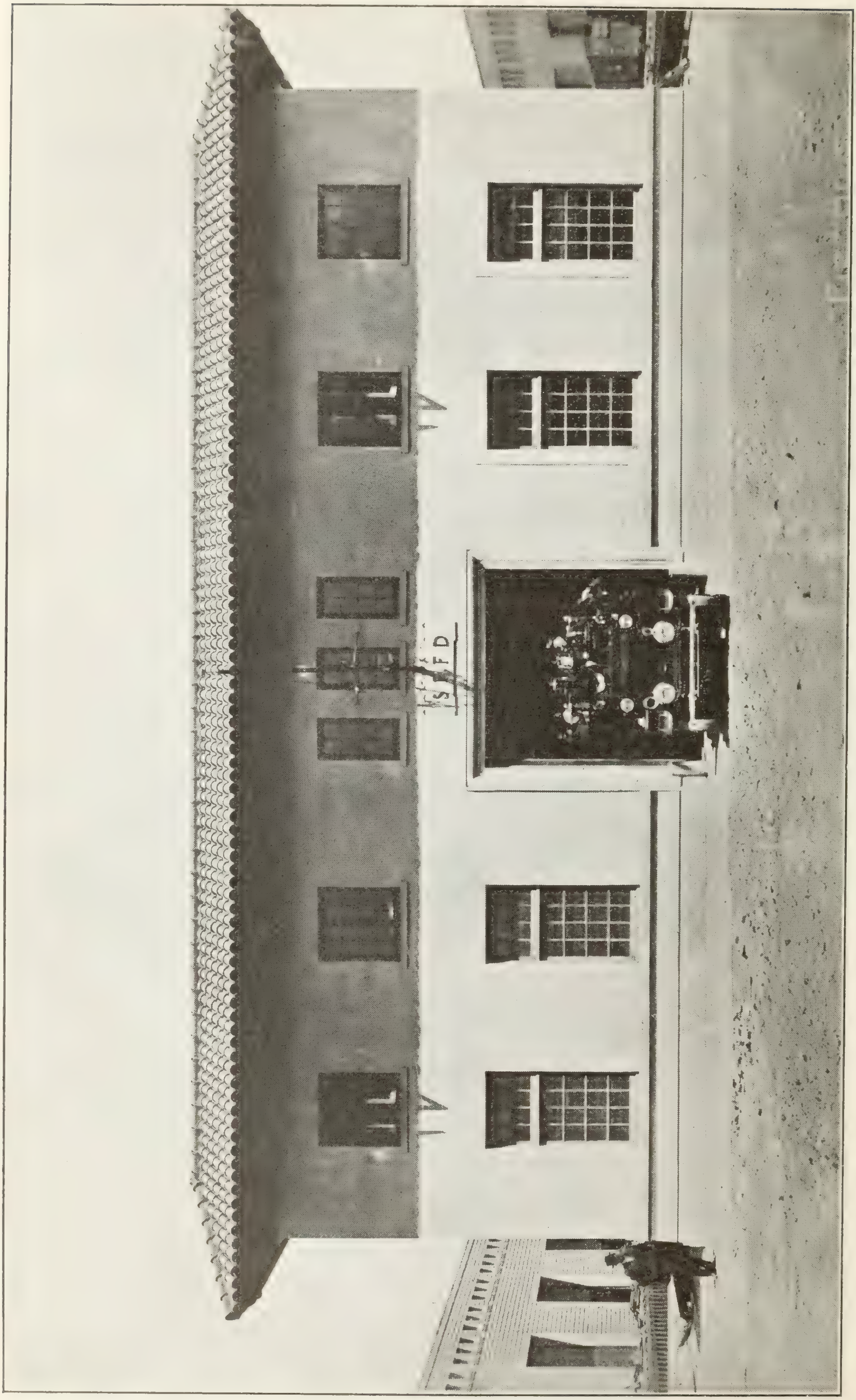
8. *Acme Lumber Company* vs. *Daniel A. Ryan, members of the Board of State Harbor Commissioners, etc., et al.* Action in forcible entry and detainer involving Potrero Nuevo Block No. 523, and which is still pending in the superior court. This block is included in the 63 blocks involved in the condemnation suit, our contention being that it belongs to the state. A right-of-way over it was granted in 1868 to the Western Pacific and Southern Pacific railroad companies, but never used. The fee, however, is claimed by the Southern Pacific Company.

On December 10, 1914, charges were filed against *James Coleman Maher,* engineer on the Tug "Gov. Irwin," for incompetency and inefficiency. A hearing was had before Civil Service Commissioner Reed on December 31, 1914, and said Maher found guilty of the charges against him and discharged.

David R. Pettingell vs. *Board of State Harbor Commissioners.* Application before the Industrial Accident Commission for workmen's compensation. It was determined that Pettingell's injuries were not due to anything that happened during the discharge of his duties as an employee of the board, and judgment was rendered for the board.

Respectfully submitted.

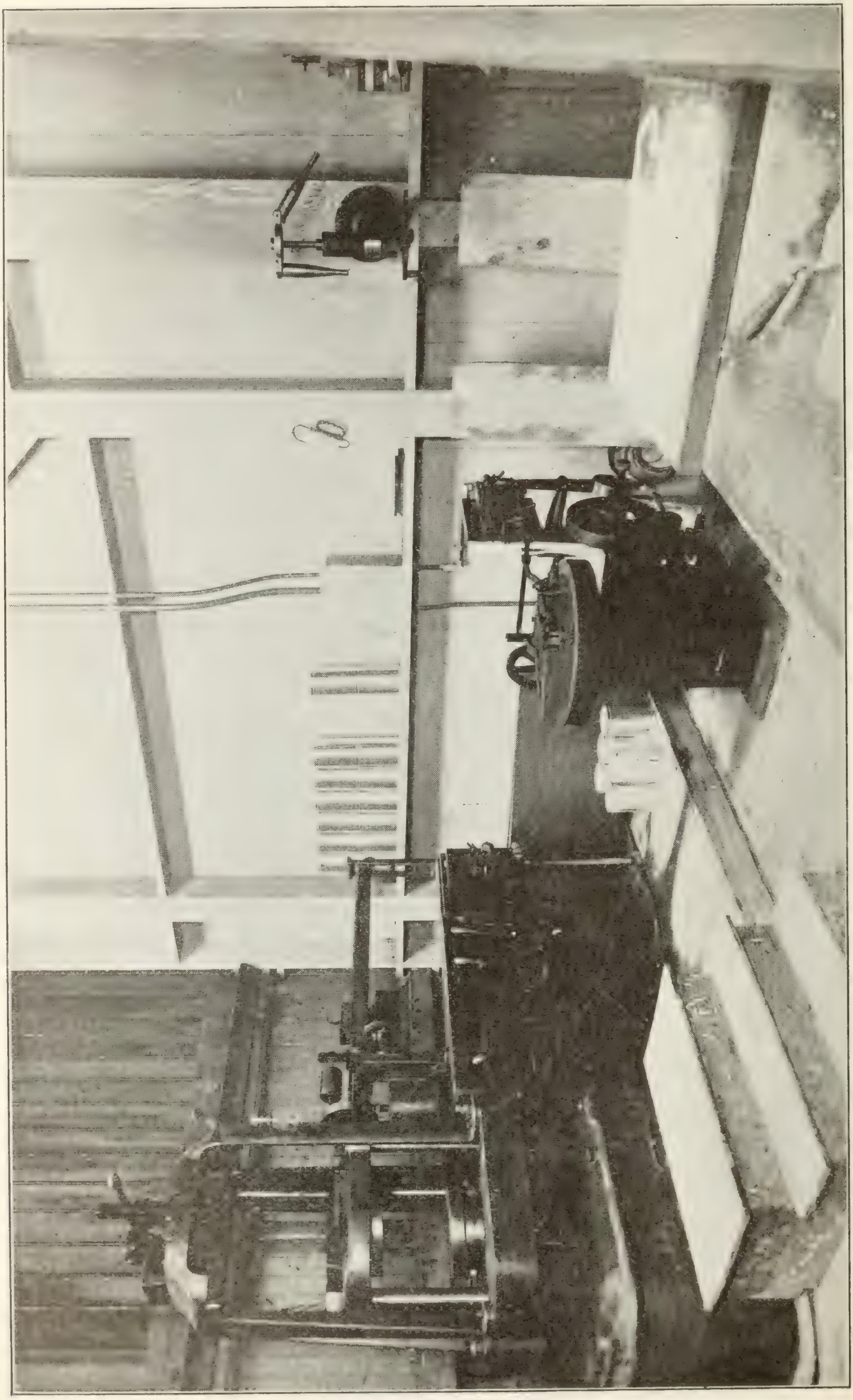
DANIEL A. RYAN.



FIRE HOUSE BETWEEN PIERS 24 AND 26

PART IV.

Report of Superintendent of Belt Railroad.



TESTING MACHINES IN LABORATORY

REPORT OF SUPERINTENDENT OF BELT RAILROAD.

San Francisco, July 1, 1916.

To The Honorable Board of State Harbor Commissioners.
San Francisco, California.

Gentlemen: I herewith submit the biennial report of the operation of the Belt Railroad for the fiscal years beginning July 1, 1914, and ending June 30, 1916.

Operation. During the past two years the Belt Railroad has been operated continuously 24 hours daily. Through the slack season eight train crews have worked in three eight-hour shifts. At present, owing to the unusual amount of foreign shipments, there are 12 crews working three shifts daily of eight hours each.

One small engine (No. 2) has been sold, and one new standard six-wheel switching engine purchased. All equipment is in good working condition. The Belt Railroad shop force have kept in repair all locomotives and cars.

The business has increased to such an extent that the question of yard room has become serious. On quite a number of occasions we have had to stop the delivery of cars from connecting railroads on account of car congestion on both northern and southern divisions.

Construction. Storage tracks have been increased on Seawall Lots 1 and 2, and a new spur track constructed on Jefferson street between Jones and Hyde streets. Tracks have been constructed on Piers 15, 16, 18, 20, 22, 24, 35, 37 and 38, and on Seawall Lot 20. The maintenance of way force have constructed the new tracks, and made all repairs to other belt line tracks.

Recommendation. On account of the steady increase of business and new industries south of Channel street on the bay shore, I recommend that the Belt Railroad be extended as far south, at least, as Butchertown.

Respectfully submitted.

F. A. Stevens.

PART V.

Report of the Secretary.

REPORT OF THE SECRETARY.

San Francisco, July 1, 1916.

To The Honorable The Board of State Harbor Commissioners.

Gentlemen: As provided by law, I am attaching my report for the biennial period from July 1, 1914, to June 30, 1916.

This report is comprised of the following:

- Account I.—Comparative balance sheet.
  - Schedule *A*—Analysis of accounts receivable.
  - Schedule *B*—Analysis of claims payable.
  - Schedule *C*—Analysis of fixed assets—Properties, new construction, etc.
  - Schedule *D*—Analysis of fixed assets—Equipment.
- Account II.—Comparative revenue and expense statement.
  - Schedule *A*—Analysis of revenue from operation.
  - Schedule *B*—Analysis of cost of operation.
  - Schedule *C*—Analysis of revenue from switching.
- Account III.—Fort Mason tunnel account.
  - The contract work completed since June 30, 1914, and that under way June 30, 1916.

Your attention is particularly directed to the more prosperous condition at June 30, 1916, than at June 30, 1915. This is reflected in Account I, which shows an increase in surplus from $6,639,386.46 to $7,812,879.72.

Of further interest in this account is the increase of the fixed assets by $927,889.34, and a reduction of the bonds liability by the redemption of 868 bonds of the San Francisco Seawall issue.

This prosperous condition is further illustrated by Schedule A to Account I. Gross revenue for the second half over the first half of the biennial period increased approximately 12.2 per cent, yet the uncollected accounts at June 30, 1916, were only 3.2 per cent greater than at June 30, 1915, and the accounts over six months old still uncollected were only 1.5 per cent of the whole at June 30, 1916, as against 4 per cent at June 30, 1915.

In Account II and its supporting schedules you will find especial interest. I have shown here how the net revenue for the second half of the period under review was $431,024.28, as against $304,645.98 for the first half, which permitted the subtraction, as extraordinary deductions, of the losses sustained at Piers 5 and 46, but still leaving an increase at June 30, 1916, over June 30, 1915.

I have made Account III a part of my report because the conditions surrounding the construction of the Fort Mason tunnel were different from those which usually surround new construction undertaken by you, owing to the fact that you were permitted by the United States government to charge a toll on every car passing through the tunnel to repay the cost plus interest of that part of the construction within the Fort Mason military reservation.

It might naturally be expected that from the date of acceptance, October 22, 1914, to June 30, 1915, during which time the Exposition was nearing completion, exhibits were moving in, and the Exposition was opened, the revenues would be large. As a matter of fact, this account shows that in that time there was not enough earned to even pay the interest, while in the fiscal year following there was earned enough to cover the deficit from the previous period, the interest for that period, and to apply the balance on the original cost.

In conclusion, I may say that you will find the various accounts and schedules fully cover the financial transactions of this biennial period and that no further comment is needed.

Respectfully submitted.

LEO V. MERLE, JR.,
Secretary.

PART VI.

Financial Statistics.

ACCOUNT

Comparative Balance Sheet as of

Assets	June 30, 1915		
Current			$1,580,350 64
Cash		$1,312,163 11	
San Francisco Harbor Improvement Fund	$209,708 99		
Second San Francisco Seawall Fund	1,096,961 24		
San Francisco Seawall Fund	5,492 88		
Accounts receivable		109,377 99	
Insurance receivable (see footnote)			
Inventory—materials and supplies		158,809 54	
Deferred charges to operation			3,758 37
Fire insurance premium prepaid		$3,191 30	
Undistributed expense		567 07	
Contingent			9,035 83
Revenues assessed at Army Street Wharf not collected because of litigation.			
Fixed			16,444,930 56
Properties, real estate purchased, new construction, etc., cost or inventory values		$16,113,543 23	
Equipment—cost or inventory value		331,387 33	
Trust funds			913,664 76
San Francisco Seawall Sinking Fund—State Treasurer trustee		$775,099 51	
Second San Francisco Seawall Sinking Fund—State Treasurer trustee		138,300 00	
Guarantee deposits with American National Bank		265 25	
Total of assets			$18,951,740 16

*Indicates decrease.

I.

June 30, 1915, and June 30, 1916.

June 30, 1916			Increase or decrease		
--------------	--------------	$1,307,590 35	--------------	--------------	*$272,760 29
--------------	$1,052,231 50	--------------	--------------	*$259,931 61	
$449,856 97	--------------	--------------	$240,147 98		
596,881 65	--------------	--------------	*500,079 59		
5,492 88					
--------------	112,803 69	--------------	--------------	3,425 70	
--------------	41,794 87	--------------	--------------	41,794 87	
--------------	100,760 29	--------------	--------------	*58,049 25	
--------------	--------------	13,066 83	--------------	--------------	9,308 46
--------------	$13,066 83	--------------	--------------	$9,875 53	
--------------	--------------	--------------	--------------	*567 07	
--------------	--------------	13,111 22	--------------	--------------	4,075 39
--------------	--------------	17,372,819 90	--------------	--------------	927,889 34
--------------	$17,015,373 56	--------------	--------------	$901,830 33	
--------------	357,446 34	--------------	--------------	26,059 01	
--------------	--------------	224,453 81	--------------	--------------	*689,210 95
--------------	$74,165 56	--------------	--------------	*$700,933 95	
--------------	150,000 00	--------------	--------------	11,700 00	
--------------	288 25	--------------	--------------	23 00	
		$18,931,042 11			*$20,698 05

ACCOUNT

Comparative Balance Sheet as of

Liabilities	June 30, 1915		
Current			$320,619 01
Claims payable		$318,136 43	
San Francisco Harbor Improvement Fund	$107,085 15		
Second San Francisco Seawall Fund	211,051 28		
Award—Industrial Accident Commission		2,482 58	
Deferred			903,103 68
Prepaid rents		$561,468 68	
Commission on sale of bonds authorized, Chapter 628, Statutes 1913		341,635 00	
Bonded debt			10,098,000 00
San Francisco Seawall issue		$1,800,000 00	
Authorized	$2,000,000 00		
Less bonds redeemed	200,000 00		
Second San Francisco Seawall issue		$8,298,000 00	
Authorized	$9,000,000 00		
Less unissued	702,000 00		
Sinking Fund reserves			990,365 76
Redemption of bonds		$788,405 76	
San Francisco Seawall issue	$788,405 76		
Second San Francisco Seawall issue			
Accrued interest		$201,960 00	
San Francisco Seawall issue	$36,000 00		
Second San Francisco Seawall issue	165,960 00		
Trust fund reserves			265 25
Deposits guaranteeing street work		200 00	
Deposits for police badges		65 25	
Total liabilities			$12,312,353 70
Excess of assets or surplus			6,639,386 46
Total liabilities and surplus			$18,951,740 16

*Indicates decrease.

NOTE.—Represents the adjusted amount of insurance due the commission for the fire loss sustained at Pier 46 on June 4, 1916. This amount was settled in full in the month of July, 1916.

I—Continued.

June 30, 1915, and June 30, 1916.

June 30, 1916			Increase or decrease		
		$175,371 62			*$145,247 39
	$173,669 04			*$144,467 39	
$134,999 59			$27,914 44		
38,669 45			*172,381 83		
	1,702 58			*780 00	
		743,533 91			*159,569 77
	$497,238 91			*$64,229 77	
	246,295 00			*95,340 00	
		9,932,000 00			*166,000 00
	$932,000 00			*$868,000 00	
$2,000,000 00					
1,068,000 00					
	9,000,000 00			702,000 00	
$9,000,000 00					
		266,968 61			*723,397 15
	$68,328 61			*$720,077 15	
$68,328 61					
	198,640 00			*3,320 00	
$18,640 00					
180,000 00					
		288 25			23 00
	$200 00				
	88 25				
		$11,118,162 39			*$1,194,191 31
		7,812,879 72			1,173,493 26
		$18,931,042 11			*$20,698 05

ACCOUNT I

Analysis of Accounts Received as

	Total		June accounts outstanding		May accounts outstanding	
	June 30, 1915	June 30, 1916	June 30, 1915	June 30, 1916	June 30, 1915	June 30, 1916
Dockage accounts	$18,530 85	$15,523 85	$16,193 75	$13,225 25	$125 15	$1,256 00
Percentage unpaid dockage			87.4	85.1	02.3	08.1
Tolls accounts	37,312 54	33,660 72	35,298 45	32,782 17	1,107 90	699 85
Percentage of unpaid tolls			94.5	97.3	02.9	02.1
Switching accounts	27,749 00	43,392 59	17,681 75	29,837 50	8,735 75	13,257 50
Percentage unpaid switching			63.7	68.8	31.5	30.6
Sales and charges accounts	15,788 45	9,657 29	13,559 77	9,346 38	32 61	
Percentage of unpaid sales and charges			85.9	96.8	00.2	
Rent accounts	9,987 15	10,569 33	7,220 59	1,746 01	564 96	2,908 25
Percentage of unpaid rent			72.4	44.9	05.7	27.6
Total per Account I	$109,377 99	$112,863 69	$89,954 31	$89,937 31	$10,866 40	$18,121 60
Percentage of total			82.3	79.7	09.9	16.1

NOTE.—The increase in rents uncollected for the months of April and May, 1916, over 1915 is due to the fact that in 1916 the new contract with the United States Post Office Department was effective which provided that rental for their assignment is payable quarterly in arrears at the rate of $2,500.00 per month.

The month of June reflects a greater amount uncollected than any other month because practically all the charges for revenue for any particular month are billed after the close of the month for which they are assessed.

ACCOUNT I

Analysis of Claims Payable as of

	Total		June items unpaid	
	June 30, 1915	June 30, 1916	June 30, 1915	June 30, 1916
Payable from—				
San Francisco Harbor Improvement Fund	$107,085 15	$134,999 59	$71,250 15	$101,774 00
Second San Francisco Seawall Fund	211,051 28	38,669 45	157,213 82	35,053 83
Total per Account I	$318,136 43	$173,669 04	$231,463 97	$136,827 83
Percentage of total			72.8	78.7

NOTE.—There is credited each month to this account one-twelfth of the yearly amount payable for commission on sale of bonds which, in this statement, increases the unpaid amounts for the months of February, March, April, May and June $7,945.00 per month more than they would otherwise be shown. The total yearly amount is paid in February.

SCHEDULE A.

of June 30, 1915, and June 30, 1916.

April accounts outstanding		January, February and March accounts outstanding		Immediately previous calendar year accounts outstanding		All other accounts outstanding	
June 30, 1915	June 30, 1916	June 30, 1915	June 30, 1916	June 30, 1915	June 30, 1916	June 30, 1915	June 30, 1916
$369 35	$74 35	$224 35	$25 65	$566 05	$198 40	$752 20	$714 20
01.9	00.4	01.2	00.2	03.1	01.5	04.1	04.7
916 94	119 60	18 85	5 60	40	53 50	------	------
		Less than	Less than	Less than			
02.5	00.4	00.1	00.1	00.1	00.2	------	------
778 00	197 50	149 50	------	351 50	------	72 50	100 00
02.8	00.4	00.6	------	01.2	------	00.2	00.2
415 25	------	------	55 39	92 66	55 90	1.688 13	199 62
02.6	------	------	00.6	00.6	00.6	10.7	02.0
436 71	2,608 25	836 36	75 00	290 00	86 82	618 50	145 00
04.3	24.6	08.4	00.7	02.9	00.8	06.3	01.4
$2,916 28	$2,999 70	$1,229 06	$161 64	$1,300 61	$394 62	$3,111 33	$1,188 82
02.7	02.6	01.1	00.1	01.2	00.4	02.8	01.1

SCHEDULE B.

June 30, 1915, and June 30, 1916.

May items unpaid		April items unpaid		January, February and March items unpaid		Prior items unpaid
June 30, 1915	June 30, 1916	June 30, 1915	June 30, 1916	June 30, 1915	June 30, 1916	June 30, 1916
$8,995 13	$9,374 79	$7,918 00	$7,945 00	$15,891 87	$15,905 80	------
53,836 71	2,615 62	------	------	75	------	1,000 00
$62,831 84	$11,990 41	$7,918 00	$7,945 00	$15,892 62	$15,905 80	$1,000 00
19.8	06.9	02.5	04.6	04.9	09.2	00.6

ACCOUNT I—SCHEDULE C.

An Analysis of Fixed Assets—Properties, New Construction, Real Estate Purchased, etc., as Reflected by the Inventory of December 31, 1915, and the Cost Records Representing the Values of Such Comparatively as of June 30, 1915, and June 30, 1916.

	Value as of June 30, 1915		Values added between June 30, 1915, and June 30, 1916		Value as of June 30, 1916	
Seawall lots		$149,835 62		$1,646 33		$151,481 95
Piers and wharves		8,987,791 15		621,067 46		9,608,858 61
Fisherman's wharf	$28,549 05		$450 58		$28,999 63	
Pier 41	227,605 98				227,605 98	
Pier 39	559,093 37		64 06		559,157 43	
Pier 37	383,634 28		9,592 59		393,226 87	
Pier 35	301,357 16		316,969 12		618,326 28	
Pier 33	2,216 60				2,216 60	
Pier 31	4,213 38		3,936 18		8,149 56	
Pier 29	6,910 34		199,328 96		206,239 30	
Pier 27	213,235 99		2,325 81		215,561 80	
Pier 25	133,513 84				133,513 84	
Pier 23	86,775 80				86,775 80	
Pier 21	96,616 08				96,616 08	
Pier 19	81,930 00				81,930 00	
Pier 17	303,351 56				303,351 56	
Pier 15	164,783 87				164,783 87	
Pier 13	134,906 09				134,906 09	
Pier 11	55,346 08		6,485 03		61,831 11	
Pier 9	116,297 37		2,980 67		119,278 04	
Pier 7	57,921 94		12 22		57,934 16	
Pier 5	52,980 17				52,980 17	
Pier 3	42,909 46		2,286 22		45,195 68	
Pier 1			28 68		28 68	
Pier 16	229,191 77		5,145 44		234,337 21	
Pier 18	232,419 76		10,608 83		243,028 59	
Pier 20	62,767 21		35,270 80		98,038 01	
Pier 22	3,748 06		113,671 41		117,419 47	
Pier 24	148,699 49		71,746 87		220,446 36	
Pier 26	658,307 58		202 63		658,510 21	
Pier 28	451,020 54				451,020 54	
Piers 30 and 32	1,256,763 70				1,256,763 70	
Pier 34	167,971 00		16 99		167,987 99	
Pier 36	394,954 82		16 99		394,971 81	
Pier 38	324,023 00		1,598 82		325,621 82	

Pier 40	331,720 00		228 56		331,948 56	
Piers 42 and 44	371,673 00		2,681 35		374,354 35	
Pier 46	255,853 71		—*165,759 88		90,093 83	
Second street	6,997 00				6,997 00	
Third street	28,369 00				28,369 00	
Berry street	45,934 72				45,934 72	
Channel street	33,000 00				33,000 00	
China Basin	170,030 44		195 33		170,225 77	
Pier 54	284,037 97				284,037 97	
Sixteenth street	95,233 53				95,233 53	
Central Basin	102,611 00				102,611 00	
Car ferry slips—Powell street	278,315 41		983 20		279,298 64	
Union Depot and ferry slips (includes Ferry Building, Post Office Building, Wells Fargo and American Express Building, etc.)		2,263,598 52		96,736 54		2,360,335 06
Union Depot	$1,298,623 37		$67,822 11		$1,366,445 51	
Ferry slips	964,975 15		28,914 40		993,889 55	
Seawall sections (includes retaining walls, bulkheads, buildings on bulkheads, etc.)		3,906,129 90		110,253 36		4,016,383 26
Section E	$251 00				$251 00	
Section D	16,004 14				16,004 14	
Section C	14,042 23				14,042 23	
Section B	131,202 26				131,202 26	
Section A	98,314 53				98,314 53	
Section 1	181,781 40				181,781 40	
Section 2	192,104 09				192,104 09	
Section 3	265,858 50		344 01		266,202 51	
Section 4	293,117 01		67 53		293,184 54	
Section 5	199,411 57		11,275 70		210,687 27	
Section 6	172,143 09		36,518 76		208,661 85	
Section 7	235,664 60		453 40		236,118 00	
Section 8A	96,150 57				96,150 57	
Section 8B	104,101 01		20,169 97		124,270 98	
Section 8	98,139 80				98,139 80	
Section 9A	428,118 66		2,057 35		430,176 01	
Section 9B	302,361 54		25,819 00		328,180 54	
Section 9	297,401 01		12,238 38		309,639 39	
Section 10	135,359 45				135,359 45	
Sections 11 and 11A	209,429 87		891 22		210,321 09	
Section 12	246,908 86				246,908 86	

ACCOUNT I—SCHEDULE C—Continued.

	Value as of June 30, 1915		Values added between June 30, 1915, and June 30, 1916		Value as of June 30, 1916	
Section 13	$182,788 71		$418 04		$183,206 75	
Section 16	5,476 00				5,476 00	
Belt Railroad		$743,703 94		$48,930 84		$792,634 78
Offices	$1,000 00		$109 75		$1,109 75	
Roundhouse, shops, sheds, platforms, etc.	44,063 18		86 63		44,149 81	
Main line tracks, yards, spurs	698,640 76		48,734 46		747,375 22	
Pier and street lights		37,711 65		18,898 53		56,610 18
Sewers		6,235 47		202 50		6,437 97
Miscellaneous (includes landing floats, state boom at Hunters' Point, etc.)		18,536 98		4,094 77		22,631 75
Total per account I		$16,113,543 23		$901,830 33		$17,015,373 56

*The deduction of $165,759.88 opposite Pier 46 under the caption "Added between June 30, 1915, and June 30, 1916" represents an addition to the value of this pier in that period of $13.34 and a deduction of $165,773.22, which is the amount of loss sustained by the fire of June 4, 1916.

ACCOUNT I—SCHEDULE D.

An Analysis of Fixed Assets—Equipment—as Reflected by the Inventory of December 31, 1915, and the Cost Records, Showing the Values Comparatively as of June 30, 1915, and June 30, 1916.

	Value as of June 30, 1915		Value as of June 30, 1916		Values added between June 30, 1915, and June 30, 1916	
Ferry Building		$19,468 00		$19,824 28		$356 28
Furniture and fixtures	$11,917 75		$12,010 53		$92 78	
Tools	65 25		78 75		13 50	
Equipment	7,485 00		7,735 00		250 00	
Executive offices						
Furniture and fixtures		6,991 15		7,756 11		764 96

Engineer's department		7,356 25		7,922 45		566 20
Furniture and fixtures	$2,170 50		$2,578 43		$407 93	
Tools			1 90		1 90	
Equipment	5,185 75		5,342 12		156 37	
Electrical department		12,161 83		14,272 65		2,110 82
Furniture and fixtures	$5 91		$87 82		$81 91	
Tools	213 07		340 31		127 24	
Equipment	11,942 85		13,844 52		1,901 67	
Purchasing department		153 58		541 41		387 83
Furniture and fixtures						
Piers and wharves		1,159 96		1,642 27		482 37
Furniture and fixtures	$921 90		$1,404 27		$482 37	
Equipment	238 00		238 00			
Maintenance and repair department		29,395 08		32,558 38		3,163 30
Furniture and fixtures	$342 40		$360 00		$17 60	
Tools	2,260 58		3,449 06		1,188 48	
Equipment	26,792 10		28,749 32		1,957 22	
Tugs and dredgers department		162,563 43		165,082 16		2,518 73
Furniture and fixtures	$54 50		$90 77		$36 27	
Tools	619 38		712 63		93 25	
Equipment	161,889 55		164,278 76		2,389 21	
Belt Railroad		84,399 11		86,048 49		1,649 38
Furniture and fixtures	$377 83		$521 51		$143 68	
Tools	5,146 28		6,521 12		1,374 84	
Equipment	78,875 00		79,005 86		130 86	
Miscellaneous		7,739 00		21,798 14		14,059 14
Automobiles	$4,251 88		$6,549 38		$2,297 50	
Fire equipment	3,487 12		15,248 76		11,761 64	
Totals per account I		$331,387 33		$357,446 34		$26,059 01

ACCOUNT II.

Comparative Statement of Revenue and Expense as of June 30, 1915, and June 30, 1916.

	June 30, 1915			June 30, 1916			Increase or decrease June 30, 1916, over June 30, 1915	
Revenue from operation			$1,700,807 45			$1,909,353 71		$208,546 26
Rent		$825,703 50			$914,876 11		$89,172 61	
Dockage		233,021 00			204,877 71		*28,143 29	
Tolls		388,808 46			438,449 37		49,640 91	
Switching		237,562 50			334,124 50		96,562 00	
Wharfage		10,885 35			10,770 70		*114 65	
Interest		2,691 01			4,246 57		1,555 56	
Cash discount		2,135 63			2,008 75		*126 88	
Cost of operation			906,432 09			971,940 79		65,508 70
General and operating		$492,057 56			$492,268 26		$210 70	
Repairs		405,765 27			468,014 83		62,249 56	
Industrial accident compensation		5,147 25			6,814 73		1,667 48	
Fire insurance		3,462 01			4,842 97		1,380 96	
Net revenue from operation			$794,375 36			$937,412 92		$143,037 56
Miscellaneous additions			8,276 68			9,703 02		1,426 34
Sale of old material		$4,665 28			$7,202 80		$2,537 52	
Recovered for damages to state property, alterations for tenants, etc.		3,611 40			2,500 22		*1,111 18	
Charged	$24,620 82			$42,425 72				
Cost less overhead	21,009 42			39,925 50				
Total			$802,652 04			$947,115 94		$144,463 90

Fixed charges			498,006 06			516,091 66		18,085 60
Interest on bonds		$370,193 70			$396,076 00		$25,882 30	
Second S. F. Seawall issue	$294,193 70			$341,436 00				
S. F. Seawall issue	76,000 00			54,640 00				
Redemption of bonds		127,812 36			120,015 66		*7,796 70	
S. F. Seawall issue								
Net income			$304,645 98			$431,024 28		$126,378 30
Extraordinary deductions						130,873 94		130,873 94
Fire loss Pier 46					$121,326 09			
Loss and damage Pier 5					6,517 85			
			$304,645 98			$300,150 34		*$4,495 64
Add—inventory adjustment						6,121 04		6,121 04
Total creditable to surplus			$304,645 98			$306,271 38		$1,625 40

*Indicates decrease.

ACCOUNT II

Analysis of Revenue from Operation as

Locations at which earned	Total		Dockage	
	June 30, 1915	June 30, 1916	June 30, 1915	June 30, 1916
Section B and C of the seawall	$16,271 87	$14,062 91	$2,809 55	$2,759 15
Fisherman's wharf	11,941 25	11,283 25	------------	------------
Car ferry slips	45,765 40	49,308 61	------------	------------
Pier 41	7,911 01	17,721 50	3,615 95	6,075 35
Pier 39	14,004 88	12,745 42	6,706 50	4,175 75
Pier 37	3,133 31	31,205 17	1,425 10	7,407 65
Pier 33	915 24	915 24	------------	------------
Pier 27	12,301 68	7,965 00	4,826 10	2,326 10
Pier 25	16,819 00	19,233 06	6,022 20	3,837 90
Pier 23	14,818 85	14,504 59	3,993 20	3,642 45
Pier 21	19,968 06	15,139 64	6,584 30	4,692 05
Pier 19	14,420 12	16,366 87	6,159 75	6,264 60
Pier 17	27,347 14	22,993 47	6,301 30	3,437 15
Pier 15	9,565 25	16,219 73	1,425 05	2,689 20
Pier 13	30,379 44	23,342 69	11,531 75	10,049 90
Pier 11	18,044 37	16,686 75	2,924 85	4,436 50
Pier 9	27,343 48	12,948 47	4.637 35	2,903 85
Pier 7	26,093 40	22,813 17	9,497 60	8,181 25
Pier 5	32,201 29	26,933 96	9,549 95	7,841 15
Pier 3	23,948 98	21,116 18	7,728 55	6,549 25
Pier 1	8,534 13	10,082 10	4,886 95	5,061 25
Pier 14	8,173 51	6,886 94	3,889 60	1,555 00
Pier 16	3,329 93	30,370 98	617 25	4,494 25
Pier 18	11,316 64	27,749 51	3,701 80	3,779 55
Pier 20	7,581 13	10,061 87	2,468 25	1,981 75
Pier 22	480 00	3,317 16	------------	787 05
Pier 24	184 00	22,327 44	------------	4,025 40
Pier 26	41,685 22	37,023 70	8,654 85	6,171 00
Pier 28	36,872 92	41,345 17	9,158 15	9,397 40
Pier 30	43.121 53	38,452 83	7,165 50	5.064 60
Pier 32	46,586 39	40,566 71	9,235 95	5,853 10
Pier 34	29,020 53	22,986 42	8,775 45	5,592 55
Pier 36	28,473 35	38,623 00	10,440 30	8,834 30
Pier 38	18.984 92	19,433 02	4,238 25	4,136 85
Pier 40	22,981 08	22,861 72	6,615 80	6,524 25
Piers 42 and 44	55,366 86	39,108 38	17,814 45	8,639 51
Pier 46	39,756 80	44,581 43	7,077 40	7,280 95
Berry Street wharf	10,775 44	10,733 01	1,783 85	1,892 95
Third Street wharf	12,454 00	10,612 04	3,912 00	2,992 15
Channel Street wharf	16,303 29	14,288 35	3,005 25	2,199 75
China Basin wharves	35,831 40	48,722 32	3,393 00	2,614 75
Pier 54	32,121 03	35,038 20	6,406 90	4,830 75
Central Basin and car ferry slips	125,226 21	126,509 60	11.690 30	11,365 60
Army street	4,945 77	6,846 17	2,320 70	2,530 95
Coal hoppers	1,940 55	845 85	------------	------------
Seawall lots	126,279 39	130,537 36	------------	------------
Total revenue from—				
Piers and general water front	$1,141,550 04	$1,213,416 96	$233,021 00	$204,877 71
Ferry Building (Union Depot)	297,463 92	336,396 93	------------	------------
Streets	12,264 35	12,150 00	------------	------------
Belt Railroad	237,562 50	334,124 50	------------	------------
Miscellaneous rents, interest and cash discount	11,966 64	13,265 32	------------	------------
Total revenue from operation, Account II	$1,700,807 45	$1,909,353 71	$233,021 00	$204,877 71

SCHEDULE A.

of June 30, 1915, and June 30, 1916.

Tolls		Wharfage		Rent		Miscellaneous	
June 30, 1915	June 30, 1916	June 30, 1915	June 30, 1916	June 30, 1915	June 30, 1916	June 30, 1915	June 30, 1916
$6,797 92	$6,644 36	----------	----------	$6,661 40	$4,659 40	----------	----------
----------	----------	$8,890 25	$8,216 25	3,051 00	3,067 00	----------	----------
45,765 40	49,308 61	----------	----------	----------	----------	----------	----------
2,947 56	7,736 15	80 00	----------	1,237 50	3,910 00	----------	----------
6,210 98	7,315 02	927 40	774 65	160 00	480 00	----------	----------
1,690 61	11,459 82	17 60	10 80	----------	12,326 90	----------	----------
----------	----------	----------	----------	915 24	915 24	----------	----------
6,320 63	4,428 05	734 95	490 85	420 00	720 00	----------	----------
6,682 95	7,404 15	----------	3 90	4,113 85	7,987 11	----------	----------
3,577 50	3,617 14	65	----------	7,247 50	7,215 00	----------	----------
5,259 76	5,147 84	----------	10 75	8,124 00	5,289 00	----------	----------
2,990 37	3,846 52	----------	1 35	5,270 00	6,254 40	----------	----------
8,544 03	6,167 27	----------	7 85	12,501 81	13,381 20	----------	----------
1,209 20	1,664 81	----------	----------	6,931 00	11,865 72	----------	----------
8,302 69	7,060 67	----------	----------	10,545 00	6,232 12	----------	----------
5,938 15	6,768 34	----------	----------	9,181 37	5,481 91	----------	----------
10,111 73	4,831 17	----------	208 70	12,594 40	5,004 75	----------	----------
5,495 80	4,894 27	----------	2 65	11,100 00	9,735 00	----------	----------
7,729 34	5,837 66	----------	1 00	14,922 00	13,251 15	----------	----------
8,760 81	7,713 24	----------	3 05	7,459 62	6,880 64	----------	----------
1,842 14	2,035 81	----------	----------	1,835 04	2,985 04	----------	----------
1,153 56	231 06	----------	----------	3,130 35	5,100 88	----------	----------
1,012 68	10,773 69	----------	95 60	1,700 00	15,007 44	----------	----------
6,824 64	8,362 67	----------	217 45	790 20	15,389 84	----------	----------
1,117 18	3,796 44	----------	19 35	3,995 70	4,264 53	----------	----------
----------	765 54	----------	22 65	480 00	1,741 92	----------	----------
----------	7,574 23	----------	309 85	184 00	10,417 96	----------	----------
11,034 25	8,803 08	----------	53 50	21,996 12	21,996 12	----------	----------
13,096 97	17,329 62	----------	35	14,617 80	14,617 80	----------	----------
11,620 51	9,052 71	----------	----------	24,335 52	24,335 52	----------	----------
11,057 00	8,420 17	----------	----------	26,293 44	26,293 44	----------	----------
9,063 12	6,211 91	----------	----------	11,181 96	11,181 96	----------	----------
15,716 30	24,785 15	----------	5 00	2,316 75	4,998 55	----------	----------
5,501 27	6,044 29	----------	6 90	9,245 40	9,244 98	----------	----------
6,959 28	6,906 47	----------	35 00	9,406 00	9,396 00	----------	----------
12,016 71	5,672 77	----------	17 90	25,535 70	24,778 20	----------	----------
13,990 00	13,865 48	----------	----------	18,689 40	23,435 00	----------	----------
3,046 91	3,000 03	----------	----------	5,944 68	5,840 03	----------	----------
4,454 25	4,116 79	127 75	128 10	3,960 00	3,375 00	----------	----------
2,602 04	2,212 60	----------	30 00	10,696 00	9,846 00	----------	----------
26,398 40	40,067 57	----------	----------	6,040 00	6,040 00	----------	----------
6,400 01	10,893 33	----------	----------	19,314 12	19,314 12	----------	----------
66,585 87	70,696 57	----------	97 25	46,950 04	44,350 18	----------	----------
2,468 32	4,075 22	106 75	----------	50 00	240 00	----------	----------
----------	----------	----------	----------	1,940 55	845 85	----------	----------
----------	----------	----------	----------	126,279 39	130,537 36	----------	----------
$378,296 84	$427,538 29	$10,885 35	$10,770 70	$519,346 85	$570,230 26	----------	----------
10,511 62	10,911 08	----------	----------	286,952 30	325,485 85	----------	----------
----------	----------	----------	----------	12,264 35	12,150 00	----------	----------
----------	----------	----------	----------	----------	----------	$237,562 50	$334,124 50
----------	----------	----------	----------	7,140 00	7,010 00	4,826 64	6,255 32
$388,808 46	$438,449 37	$10,885 35	$10,770 70	$825,703 50	$914,876 11	$242,389 14	$340,379 82

ACCOUNT II

Analysis of Cost of Operation as

	Total		General and operating			
	June 30, 1915	June 30, 1916	July 1, 1914, to Dec. 31, 1914	Jan. 1, 1915, to June 30, 1915	Total July 1, 1914, to June 30, 1915	July 1, 1915, to June 30, 1916
Piers and general waterfront	$494,561 84	$553,448 03	$103,773 77	$99,671 24	$203,445 01	$192,122 27
Ferry Bldg. (Union Depot)	73,474 31	92,534 85	26,681 37	28,525 54	55,206 91	65,930 13
Streets	53,897 58	44,901 50	13,822 35	11,315 04	25,137 39	27,582 89
Belt Railroad	153,727 57	182,182 14	54,533 95	55,143 72	109,677 67	119,665 34
Office, admin., and legal	59,100 34	63,155 15	27,821 30	31,279 04	59,100 34	63,155 15
General	14,060 46	35,719 12	------------	4,391 25	4,391 25	23,812 48
Undistributed	57,609 99	------------	35,098 99	------------	35,098 99	------------
Totals per Account II	$906,432 09	$971,940 79	------------	------------	$492,057 56	$192,268 26

SCHEDULE B.

of June 30, 1915, and June 30, 1916.

Repairs				Industrial accident compensation		Fire insurance premiums	
July 1, 1914, to Dec. 31, 1914	Jan. 1, 1915, to June 30, 1915	Total July 1, 1914, to June 30, 1915	July 1, 1915. to June 30, 1916	July 1, 1914, to June 30, 1915	July 1, 1915, to June 30, 1916	July 1, 1914, to June 30, 1915	July 1, 1915, to June 30, 1916
$147,088 82	$144,028 01	$291,116 83	$361,325 76	------------	------------	------------	------------
1,385 74	16,881 66	18,267 40	26,604 72	------------	------------	------------	------------
13,983 74	14,776 45	28,760 19	17,318 61	------------	------------	------------	------------
13,338 50	30,711 40	44,049 90	62,516 80	------------	------------	------------	------------
------------	1,059 95	1,059 95	248 94	$5,147 25	$6,814 73	$3,462 01	$4,842 97
22,511 00	------------	22,511 00	------------	------------	------------	------------	------------
------------	------------	$405,765 27	$468,014 83	$5,147 25	$6,814 73	$3,462 01	$4,842 97

ACCOUNT II. SCHEDULE C (Supplementing Schedule A).

An Analysis of Revenue From Switching, Showing Class of Service From Which Revenue Was Derived and the Number of Switches Performed.

	June 30, 1915				June 30, 1916			
	Switches	Revenue	Total switches	Total revenue	Switches	Revenue	Total switches	Total revenue
Local switches			79,115	$197,360 00			91,142	$227,172 50
$2.50 per car	78,773	$196,932 50			90,580	$226,450 00		
$1.25 per car (P. P. I. E. exhibits)	342	427 50			562	722 50		
Across Market switches			5,921	28,670 00			16,703	82,890 00
$5.00 per car	5,547	$27,735 00			16,453	$82,265 00		
$2.50 per car (P. P. I. E. exhibits)	374	935 00			250	625 00		
Baggage cars			242	1,172 50			328	1,612 50
$5.00 per car	227	$1,135 00			317	$1,585 00		
$2.50 per car (P. P. I. E. exhibits)	15	37 50			11	27 50		
Empties			177	265 50			325	487 50
Revenue incidental to above service, switching moves on which have been included above				10,094 50				21,962 00
Tunnel tolls (full charge)		$4,830 00				$14,440 00		
Tunnel tolls (half charge, P. P. I. E. exhibits)		3,670 00				3,715 00		
Rental charge ($2.50 car per day)		1,432 50				1,407 50		
Storage charge ($2.00 car per day)		162 00				304 00		
Intra-Exposition service						1,545 50		
Sunday service ($50.00 for use of engine and crew in addition to regular switching charge)						550 00		
Totals per Schedule A to Account II			95,455	$237,562 50			108,498	$334,124 50

ACCOUNT III.

Memorandum Account Reflecting What Has Been Accomplished Toward Paying the Cost of That Section of the Fort Mason Tunnel Within the Confines of the Fort Mason Military Reservation in Accordance With the Agreement Between the Board of State Harbor Commissioners and the United States Government.

EXCERPTS FROM AGREEMENT REFERRED TO—

Section 3. "That all freight of the United States, or freight originating or incident to any portion of the region to the east or west of Fort Mason passing through the tunnel shall pay, in addition to an equitable track and switching charge, a tunnel charge of $10.00 per car."

Section 5. "All tunnel charges shall be applied toward paying the cost of the work * * * including interest at 5 per cent per annum, and as soon as that sum has been paid said charges will cease and thereafter there shall be no further tunnel charges. If unforeseen or unusual conditions or accidents shall at any time make a further tunnel charge necessary or equitable it shall be governed by additional regulations of the Secretary of War."

Cost of that section of the tunnel within the confines of the Fort Mason Military Reservation—per Chief Engineer's figures at date of acceptance, October 22, 1914		$273,149 38
Add interest to June 30, 1915		9,391 85
		$282,541 23
Deduct charges for tunnel assessed in accordance with Section 3 (above) to June 30, 1915		8,500 00
Cars to United States Government, at $10.00	$1,250 00	
Cars to P. P. I. E., at $10.00	3,580 00	
Cars to P. P. I. E. (Exhibits), at $5.00	3,670 00	
Cost and interest value at June 30, 1915		$274,041 23
Add interest, July 1, 1915, to June 30, 1916		13,676 27
		$287,717 50
Deduct charges for tunnel, assessed in accordance with Section 3 (above) July 1, 1915, to June 30, 1916		18,155 00
Cars to United States Government, at $10.00	$5,700 00	
Cars to P. P. I. E., at $10.00	8,740 00	
Cars to P. P. I. E. (Exhibits), at $5.00	3,715 00	
Cost and interest value at June 30, 1916		$269,562 50

Contract Work Under Way at Date of Last Biennial Report and Since Completed.

No.	Date of contract	Description	Contractors	Contract price	Payments	Date of payments	Total	Date of completion
143	Dec. 7, 1911	Furnishing piles	Hammond Lumber Co.	12 and 13 inch butts, 12 cents per lineal ft.; 14 and 15 inch butts, 13 cents per lineal ft.; 16, 17 and 18 inch butts, 15 cents per lineal foot.		Paid prior to July 1, 1914	$143,261 06	
					$4,568 73	July 10, 1914		
					4,457 31	Aug. 10, 1914		
					1,194 44	Sept. 11, 1914		
					2,203 74	Oct. 8, 1914		
					3,041 21	Nov. 10, 1914		
					2,960 88	Dec. 10, 1914		
					3,668 97	Jan. 11, 1915		
					4,736 06	Feb. 9, 1915		
					518 21	Mar. 10, 1915		
					1,742 77	April 8, 1915		
					3,406 14	May 13, 1915		
							32,498 46	April 30, 1915
							$175,759 52	
147	Jan. 17, 1912	Furnishing and delivering fuel oil for three years.	Standard Oil Co.	Per barrel, 65 cents		Paid prior to July 1, 1914	$23,009 80	
					$808 36	Aug. 10, 1914		
					840 65	Sept. 11, 1914		
					1,509 47	Oct. 8, 1914		
					1,615 81	Dec. 3, 1914		
					1,603 67	Jan. 11, 1915		
					887 59	Feb. 9, 1915		
					1,229 99	June 8, 1915		
					1,112 97	July 8, 1915		
					1,940 54	Aug. 5, 1915		
					852 56	Sept. 7, 1915		
					51 93	Oct. 7, 1915		
							12,453 54	Aug. 31, 1915
							$35,463 34	
						Paid prior to July 1, 1914	$23,663 55	

148	Jan. 17, 1912	Furnishing and delivering fuel oil for three years.	Associated Oil Co.	Per barrel, 65 cents	$1,102 75	July 10, 1914		
					684 18	Aug. 10, 1914		
					637 43	Sept. 11, 1914		
					816 11	Oct. 8, 1914		
					2,568 80	Nov. 10, 1914		
					750 19	Dec. 10, 1914		
					861 49	Jan. 11, 1915		
					975 67	Mar. 10, 1915		
					4,051 72	April 8, 1915		
					3,320 10	June 8, 1915		
					242 22	July 15, 1915		
					126 35	Sept. 7, 1915		
					393 24	Oct. 7, 1915		
							16,530 25	Sept. 21, 1915
							$40,193 80	
						Paid prior to July 1, 1914	$382,393 14	
177	Jan. 2, 1913	Furnishing creosoted piles	Pacific Creosoting Co.	12 in. piles, 38½ cents per foot.	$4,212 95	July 2, 1914		
					7,928 30	July 2, 1914		
				14 in. piles, 42½ cents per foot.	4,423 86	July 17, 1914		
					6,178 83	July 25, 1914		
				16 in. piles, 48½ cents per foot.	2,642 77	Aug. 6, 1914		
					1,416 80	Aug. 6, 1914		
					1,357 15	Aug. 6, 1914		
					2,059 61	Aug. 28, 1914		
					5,613 39	Sept. 3, 1914		
					452 38	Sept. 10, 1914		
					472 27	Sept. 10, 1914		
					1,278 22	Sept. 10, 1914		
					2,968 57	Sept. 17, 1914		
					259 36	Sept. 24, 1914		
					1,700 17	Oct. 1, 1914		
					2,334 19	Oct. 1, 1914		
					1,277 86	Oct. 8, 1914		
					1,871 13	Oct. 8, 1914		
					426 07	Oct. 15, 1914		
					989 52	Oct. 22, 1914		
					668 93	Oct. 22, 1914		
					3,405 80	Oct. 22, 1914		
					86 45	Oct. 29, 1914		
					86 57	Oct. 29, 1914		
					778 06	Nov. 5, 1914		

Contract Work Under Way at Date of Last Biennial Report and Since Completed—Continued.

No.	Date of contract	Description	Contractors	Contract price	Payments	Date of payments	Total	Date of completion
177	Jan. 2, 1913	Furnishing creosoted piles	Pacific Creosoting Co.		$566 72	Nov. 5, 1914		
					425 95	Nov. 12, 1914		
					222 98	Nov. 27, 1914		
					1,135 26	Nov. 27, 1914		
					28 86	Dec. 3, 1914		
							$57,268 98	Dec. 3, 1914
							$439,662 12	
						Paid prior to July 1, 1914	$144,260 04	
178	Jan. 4, 1913	Constructing Section 9A seawall	Daniel Contracting Co.	$275,700 00	$17,575 87	July 2, 1914		
				(Extras) 20,422 66	666 49	July 2, 1914		
					1,291 50	July 9, 1914		
					1,216 44	July 30, 1914		
					1,401 10	Aug. 6, 1914		
					23,779 13	Aug. 6, 1914		
					16,542 00	Sept. 3, 1914		
					101 09	Sept. 17, 1914		
					3,838 85	Sept. 24, 1914		
					974 26	Sept. 24, 1914		
					36 62	Sept. 24, 1914		
					34 73	Sept. 24, 1914		
					8 88	Oct. 1, 1914		
					4,135 50	Oct. 8, 1914		
					1,649 84	Oct. 8, 1914		
					4,135 50	Oct. 27, 1914		
					549 96	Nov. 12, 1914		
					68,925 00	Nov. 27, 1914		
					3,755 93	Dec. 24, 1914		
					1,238 75	Dec. 24, 1914		
					5 18	Dec. 24, 1914		
							151,862 62	Nov. 27, 1914
				$296,122 66			$296,122 66	
179	Jan. 4, 1913	Constructing Section 9B seawall	Daniel Contracting Co.	$220,000 00	$1,216 44	July 30, 1914		
				(Extras) 47,775 08	1,401 10	Aug. 6, 1914		

						18,150 00	Aug. 6, 1914		
						21,450 00	Sept. 3, 1914		
						2,306 89	Sept. 24, 1914		
						3,279 28	Sept. 24, 1914		
						1 55	Sept. 24, 1914		
						28,050 00	Oct. 8, 1914		
						33,000 00	Nov. 5, 1914		
						24,750 00	Dec. 3, 1914		
						3,709 00	Dec. 24, 1914		
						1,475 22	Dec. 24, 1914		
						5,198 17	Jan. 7, 1915		
						279 43	Jan. 7, 1915		
						13,200 00	Jan. 7, 1915		
						6,600 00	Feb. 4, 1915		
						10,210 20	Feb 4, 1915		
						1,732 73	Feb. 11, 1915		
						6,600 00	Mar. 4, 1915		
						43 78	Mar. 4, 1915		
						424 62	Mar. 4, 1915		
						1,633 27	Mar. 4, 1915		
						116 61	Mar. 11, 1915		
						3,403 40	Mar. 11, 1915		
						1,476 32	Mar. 11, 1915		
						8,250 00	April 8, 1915		
						544 43	April 8, 1915		
						2,106 30	April 15, 1915		
						438 46	April 15, 1915		
						520 73	April 29, 1915		
						4,688 65	May 6, 1915		
						388 24	May 6, 1915		
						4,950 00	May 6, 1915		
						702 10	May 20, 1915		
						348 75	May 27, 1915		
						129 41	June 10, 1915		
						55,000 00	June 10, 1915		
					$267,775 08			$267,775 08	May 6, 1915
181	Feb. 20, 1913	Constructing Pier No. 39	Healy-Tibbitts Construction Co.		$436,400 00	------------	Paid prior to July 1, 1914	$439,290 72	
				(Extras)	5,566 72	$2,676 00	July 2, 1914	2,676 00	July 2, 1914
					$441,966 72			$441,966 72	

Contract Work Under Way at Date of Last Biennial Report and Since Completed—Continued.

No.	Date of contract	Description	Contractors	Contract price	Payments	Date of payments	Total	Date of completion
195	Nov. 20, 1913	Furnishing lumber for one year	James H. Hardy, Inc.	Prices as per bid on file in Secretary's office.		Paid prior to July 1, 1914	$21,629 83	
					$3,724 77	July 2, 1914		
					2,732 91	July 2, 1914		
					3,587 74	Aug. 4, 1914		
					2,760 69	Aug. 4, 1914		
					2,320 15	Sept. 4, 1914		
					82 62	Sept. 11, 1914		
					1,363 91	Sept. 11, 1914		
					2,225 21	Oct. 2, 1914		
					3,944 88	Nov. 5, 1914		
					2,749 26	Dec. 3, 1914		
					627 66	Dec. 17, 1914	26,119 80	Dec. 3, 1914
							$47,749 63	
196	Nov. 20, 1913	Cleaning the Embarcadero for one year.	J. G. Harney	Districts 1, 2, 3, 4, 5A, 5B, 6A, 8, 9, 10, 11, 12—51 cents per 1,000 square yards; District 7—81 cents per 1,000 square yards.		Paid prior to July 1, 1914	$6,100 85	
					$1,359 62	July 2, 1914		
					1,393 48	Aug. 10, 1914		
					1,429 71	Sept. 3, 1914		
					1,411 76	Oct. 1, 1914		
					1,372 82	Nov. 10, 1914		
					1,161 84	Dec. 3, 1914	8,120 23	Nov. 30, 1914
							$14,230 08	
197	Dec. 19, 1913	Furnishing and delivering six-wheeled switching locomotive engine.	American Locomotive Co.	$16,150 00	$12,112 50	July 25, 1914		
					4,037 50	Aug. 28, 1914	$16,150 00	July 25, 1914
199	Jan. 24, 1914	Widening Pier No. 25	San Francisco Bridge Co.	$9,200 50		Paid prior to July 1, 1914	$15,200 67	
				Piling 3,951 00	$36 85	July 10, 1914		
				Planking 254 52	53 08	Sept. 17, 1914	89 93	
				$13,406 02				
				(Extras) 1,884 58				
				$15,290 60			$15,290 60	July 10, 1914
200	Jan. 26, 1914	Constructing Pier No. 46	Healy-Tibbitts Construction Co.	$146,215 00		Paid prior to July 1, 1914	$30,511 51	
				(Extras) 17,620 30	$24,125 47	July 2, 1914		

						15,352 58	Aug. 6, 1914		
						400 00	Aug. 20, 1914		
						2,100 00	Aug. 20, 1914		
						38,381 44	Sept. 3, 1914		
						2,938 73	Sept. 3, 1914		
						191 89	Sept. 17, 1914		
						5,483 06	Sept. 21, 1914		
						2,468 21	Oct. 8, 1914		
						4,254 46	Oct. 8, 1914		
						36,553 75	Oct. 26, 1914		
						152 32	Nov. 19, 1914		
						921 88	Nov. 19, 1914	133,323 79	Sept. 21, 1914
					$163,835 30			$163,835 30	
201	Feb. 19, 1914	Constructing addition on the north side of Pier No. 54.	Healy-Tibbitts Construction Co.		$14,720 00		Paid prior to July 1, 1914	$7,728 00	
				(Extras)	76 84	$3,312 00	July 2, 1914		
						76 84	July 9, 1914		
						3,680 00	Aug. 6, 1914	7,068 84	July 2, 1914
					$14,796 84			$14,796 84	
202	Mar. 5, 1914	Constructing tunnel under Fort Mason military reservation.	Bates, Borland & Ayer		$219,233 00		Paid prior to July 1, 1914	$50,682 41	
				(Extras)	52,542 21	$3,867 18	July 2, 1914		
				(Bonus)	5,900 00	994 96	July 2, 1914		
						27,952 21	July 2, 1914		
						38 95	July 30, 1914		
						331 66	Aug. 6, 1914		
						4,605 53	Aug. 6, 1914		
						21,663 71	Aug. 6, 1914		
						4,860 98	Sept. 3, 1914		
						26,307 96	Sept. 3, 1914		
						1,535 18	Sept. 10, 1914		
						148 56	Sept. 17, 1914		
						213 90	Oct. 1, 1914		
						665 91	Oct. 8, 1914		
						1,620 32	Oct. 8, 1914		
						23,019 47	Oct. 8, 1914		
						7,999 33	Oct. 8, 1914		
						130 39	Oct. 8, 1914		
						1,086 70	Oct. 22, 1914		
						13,153 98	Oct. 22, 1914		
						8,589 66	Nov. 5, 1914		
						5,900 00	Nov. 5, 1914		
						4,414 81	Nov. 6, 1914		

Contract Work Under Way at Date of Last Biennial Report and Since Completed—Continued.

No.	Date of contract	Description	Contractors	Contract price	Payments	Date of payments	Total	Date of completion
202	Mar. 5, 1914	Constructing tunnel under Fort Mason military reservation.	Bates, Borland & Ayer		$54,808 25	Nov. 27, 1914		
					2,863 22	Dec. 10, 1914		
					186 86	Dec. 10, 1914		
					309 98	Feb. 11, 1915		
					2 21	Feb. 11, 1914		
					2,658 44	April 8, 1915		
					487 60	April 8, 1915		
					1,324 70	April 8, 1915		
					2,250 19	July 8, 1915	226,992 83	Oct. 22, 1914
				$277,675 24			$277,675 24	
203	Mar. 26, 1914	Constructing two car ferry slips between Powell and Taylor streets.	Healy-Tibbitts Construction Co.	$110,600 00		Paid prior to July 1, 1914	$1,659 00	
				(Extras) 33,993 50	$1,659 00	July 2, 1914		
					24,055 50	Aug. 6, 1914		
					2,352 07	Aug. 20, 1914		
					249 60	Sept. 3, 1914		
					24,055 50	Sept. 3, 1914		
					1,419 21	Sept. 10, 1914		
					261 39	Sept. 17, 1914		
					20,737 50	Oct. 8, 1914		
					2,507 11	Oct. 15, 1914		
					6,636 00	Nov. 5, 1914		
					7,642 88	Nov. 12, 1914		
					3,318 00	Dec. 3, 1914		
					9,332 54	Dec. 10, 1914		
					829 50	Dec. 10, 1914		
					7,309 72	Jan. 7, 1915		
					2,732 09	Jan. 14, 1915		
					27,650 00	Jan. 14, 1915		
					186 89	Feb. 11, 1915	$142,934 50	Dec. 10, 1914
				$144,593 50			$144,593 50	
204	Mar. 12, 1914	Constructing passenger ferry slip No. 8	Thomson Bridge Co.	$34,587 00		Paid prior to July 1, 1914	$25,940 25	
				Altering and strengthening apron 700 00	$849 43	July 2, 1914		
					8,446 75	July 30, 1914		
					22 02	Sept. 17, 1914		
				$35,287 00				

				Less amount for substituting concrete piles in place of Holmes cylinders 900 00				
				$34,387 00				
				(Extras) 871 45			9,318 20	July 2, 1914
				$35,258 45			$35,258 45	
206	April 16, 1914	Furnishing cement for one year	Pacific Portland Cement Co.	Per barrel $1 64	$3,550 63	July 10, 1914		
					7,207 80	Aug. 13, 1914		
					2,755 20	Oct. 22, 1914		
					9,020 00	Nov. 10, 1914		
					7,125 80	Dec. 10, 1914		
					2,853 60	Jan. 11, 1915		
					4,756 00	Feb. 9, 1915		
					3,230 80	Mar. 10, 1915		
					9,011 80	April 8, 1915		
					11,660 40	May 13, 1915		
					7,887 40	June 8, 1915		
							$69,059 40	May 31, 1915
207	April 23, 1914	Furnishing creosoted piles	Pacific Creosoting Co.	12 in. butts, 37 cents per foot.		Paid prior to July 1, 1914	$29,890 20	
					$3,579 84	July 2, 1914		
				14 in. butts, 41½ cents per foot.	1,225 67	July 2, 1914		
					7,577 95	July 2, 1914		
				16 in. butts, 45½ cents per foot.	7,308 21	July 9, 1914		
					17,856 42	July 9, 1914		
				18 in. butts, 50½ cents per foot.	8,665 66	July 9, 1914		
					1,229 05	July 16, 1914		
					9,934 02	July 23, 1914		
					72 50	July 23, 1914		
					55 00	July 25, 1914		
					14,897 33	July 25, 1914		
					3,237 82	July 30, 1914		
					3,538 52	July 30, 1914		
					1,193 28	Aug. 6, 1914		
					80 00	Aug. 6, 1914		
					2,525 98	Aug. 6, 1914		
					21,014 39	Aug. 6, 1914		
					18,765 56	Aug. 6, 1914		

Contract Work Under Way at Date of Last Biennial Report and Since Completed—Continued.

No.	Date of contract	Description	Contractors	Contract price	Payments	Date of payments	Total	Date of completion
207	April 23, 1914	Furnishing creosoted piles	Pacific Creosoting Co.		$2,436 07	Aug. 13, 1914		
					5,952 14	Aug. 13, 1914		
					2,888 55	Aug. 13, 1914		
					9,135 91	Aug. 20, 1914		
					4,684 57	Aug. 27, 1914		
					4,965 78	Aug. 27, 1914		
					3,311 34	Aug. 27, 1914		
					1,266 88	Sept. 3, 1914		
					4,239 15	Sept. 3, 1914		
					12,091 53	Sept. 3, 1914		
					7,004 80	Sept. 10, 1914		
					6,255 19	Sept. 10, 1914		
					43 80	Sept. 10, 1914		
					11,067 25	Sept. 10, 1914		
					11,194 39	Sept. 17, 1914		
					10,440 54	Sept. 24, 1914		
					8,249 37	Sept. 24, 1914		
					4,385 71	Sept. 24, 1914		
					9,551 85	Sept. 24, 1914		
					3,045 30	Sept. 24, 1914		
					240 00	Oct. 1, 1914		
					1,561 52	Oct. 1, 1914		
					9,266 74	Oct. 1, 1914		
					5,402 07	Oct. 1, 1914		
					8,154 34	Oct. 8, 1914		
					9,438 40	Oct. 8, 1914		
					8,456 40	Oct. 8, 1914		
					4,030 51	Oct. 8, 1914		
					1,413 05	Oct. 8, 1914		
					422 30	Oct. 8, 1914		
					20 00	Oct. 8, 1914		
					3,689 09	Oct. 15, 1914		
					5,298 69	Oct. 22, 1914		
					8,219 29	Oct. 22, 1914		
					7,499 02	Oct. 22, 1914		
					3,731 46	Oct. 22, 1914		
					12,052 11	Oct. 29, 1914		
					140 00	Oct. 29, 1914		
					380 00	Oct. 29, 1914		

3,480 18	Oct. 29, 1914
1,461 91	Oct. 29, 1914
2,749 79	Oct. 29, 1914
3,183 95	Oct. 29, 1914
5,492 86	Oct. 29, 1914
8,111 08	Oct. 29, 1914
14,162 22	Oct. 29, 1914
10,496 14	Oct. 29, 1914
3,088 92	Nov. 5, 1914
1,800 69	Nov. 5, 1914
2,818 80	Nov. 12, 1914
3,146 13	Nov. 12, 1914
2,718 12	Nov. 12, 1914
2,739 76	Nov. 27, 1914
1,766 23	Nov. 27, 1914
2,499 68	Nov. 27, 1914
9,775 41	Nov. 27, 1914
11,753 36	Nov. 27, 1914
3,498 72	Dec. 3, 1914
4,720 74	Dec. 3, 1914
1,830 96	Dec. 3, 1914
2,703 69	Dec. 3, 1914
4,017 37	Dec. 3, 1914
7,434 93	Dec. 3, 1914
6,188 03	Dec. 3, 1914
9,297 34	Dec. 10, 1914
6,468 05	Dec. 17, 1914
7,810 35	Dec. 17, 1914
50 00	Dec. 17, 1914
2,041 53	Dec. 17, 1914
150 00	Dec. 17, 1914
4,738 60	Dec. 24, 1914
3,258 47	Dec. 31, 1914
3,917 79	Dec. 31, 1914
8,987 35	Dec. 31, 1914
10,033 47	Dec. 31, 1914
2,478 31	Jan. 7, 1915
2,062 67	Jan. 7, 1915
7,420 54	Jan. 7, 1915
4,268 36	Jan. 7, 1915
130 00	Jan. 7, 1915
3,699 12	Jan. 14, 1915
9,319 40	Jan. 14, 1915
680 51	Jan. 21, 1915

Contract Work Under Way at Date of Last Biennial Report and Since Completed—Continued.

No.	Date of contract	Description	Contractors	Contract price	Payments	Date of payments	Total	Date of completion
207	April 23, 1914	Furnishing creosoted piles	Pacific Creosoting Co.		$2,136 01	Jan. 21, 1915		
					2,603 45	Jan. 21, 1915		
					11,348 93	Jan. 21, 1915		
					80 00	Jan. 21, 1915		
					5,051 69	Jan. 21, 1915		
					1,579 53	Jan. 28, 1915		
					2,995 78	Feb. 4, 1915		
					3,344 49	Feb. 4, 1915		
					1,234 01	Feb. 4, 1915		
					2,473 52	Feb. 11, 1915		
					1,422 79	Feb. 11, 1915		
					5,371 67	Feb. 18, 1915		
					3,106 47	Feb. 18, 1915		
					3,106 20	Feb. 25, 1915		
					3,782 97	Feb. 25, 1915		
					1,683 89	Feb. 25, 1915		
					8,919 62	Mar. 4, 1915		
					411 34	Mar. 11, 1915		
					5,442 15	Mar. 18, 1915		
					42 50	Mar. 18, 1915		
					1,790 56	Mar. 25, 1915		
					6,012 80	April 1, 1915		
					6,382 12	April 1, 1915		
					1,035 39	April 1, 1915		
					2,973 21	April 8, 1915		
					1,814 05	April 22, 1915		
					1,673 70	April 22, 1915		
					1,522 24	April 22, 1915		
					2,712 80	April 29, 1915		
					2,127 38	May 6, 1915		
					2,004 27	May 6, 1915		
					507 42	May 27, 1915		
					557 90	May 27, 1915		
					6,017 45	June 3, 1915		
					904 27	June 3, 1915		
					17,106 32	June 24, 1915		
					2,471 46	July 1, 1915		
					1,374 89	July 8, 1915		

					7,531 08	July 22, 1915		
					5,702 11	July 29, 1915		
					823 82	Aug. 5, 1915		
					2,510 36	Aug. 26, 1915		
					1,366 00	Sept. 10, 1915		
					455 33	Oct. 14, 1915		
							$685,687 78	Sept. 10, 1915
							$715,577 98	
208	April 23, 1914	Furnishing cement for one year	Henry Cowell Lime and Cement Co.	Per barrel -- $1 64		Paid prior to July 1, 1914	$9,503 80	
					$2,755 20	July 10, 1914		
					12,587 00	Sept. 17, 1914		
					8,601 80	Oct. 8, 1914		
					4,723 20	Nov. 10, 1914		
					820 00	Feb. 9, 1915		
					22 25	April 8, 1915		
					3,657 20	April 15, 1915		
					721 45	May 10, 1915		
					1,185 35	July 8, 1915		
							35,073 45	June 30, 1915
							$44,577 25	
210	April 29, 1914	Constructing Pier No. 41	San Francisco Bridge Co.	$127,756 00		Paid prior to July 1, 1914	$8,623 53	
				(Extras) 542 16	$11,498 04	July 2, 1914		
					8,623 53	Aug. 6, 1914		
					22,037 91	Sept. 3, 1914		
					18,205 23	Oct. 8, 1914		
					20,121 57	Nov. 5, 1914		
					52 10	Nov. 12, 1914		
					6,707 19	Nov. 19, 1914		
					228 56	Nov. 19, 1914		
					253 75	Dec. 3, 1914		
					7 75	Dec. 24, 1914		
					31,939 00	Dec. 24, 1914		
							119,674 63	Nov. 19, 1914
				$128,298 16			$128,298 16	

Contract Work Under Way at Date of Last Biennial Report and Since Completed—Continued.

No.	Date of contract	Description	Contractors	Contract price	Payments	Date of payments	Total	Date of completion
211	April 30, 1914	Constructing wood block pavement on Pier No. 39.	Roy Mauvais (California Hardwood Lumber Co.)	$7,280 00	-------------	Paid prior to July 1, 1914	$5,460 00	
					$1,820 00	July 23, 1914	1,820 00	July 1, 1914
				$7,280 00			$7,280 00	
212	May 28, 1914	Constructing basalt block and asphalt pavement on portion of the Embarcadero.	Fay Improvement Co.	$51,769 10	$1,034 33	July 2, 1914		
				Additions 1,969 33	9,179 64	Aug. 6, 1914		
					19,219 17	Sept. 3, 1914		
				$53,738 43	10,870 68	Sept. 24, 1914		
				Extras 447 32	187 75	Oct. 1, 1914		
					259 57	Oct. 8, 1914		
					13,434 61	Oct. 29, 1914		
							54,185 75	Sept. 24, 1914
				$54,185 75			$54,185 75	
213	May 28, 1914	Repairing Pier No. 19	George W. Newsom	$18,994 00	$4,097 73	July 2, 1914		
				Additions 2,415 02	8,852 91	Aug. 6, 1914		
					3,106 12	Aug. 27, 1914		
				$21,409 02	439 83	Sept. 17, 1914		
				Extras 3,952 08	3,365 64	Sept. 17, 1914		
					5,352 26	Oct. 1, 1914		
					146 61	Oct. 22, 1914		
							25,361 10	Aug. 27, 1914
				$25,361 10			$25,361 10	
214	June 4, 1914	Constructing Pier No. 15	San Francisco Bridge Co.	$68,760 00	$3,094 20	July 2, 1914		
				(Extras) 2,842 68	5,157 00	Aug. 6, 1914		
					2,000 00	Sept. 3, 1914		
					12,376 80	Sept. 3, 1914		
					12,892 50	Oct. 8, 1914		
					10,314 00	Nov. 5, 1914		
					5,157 00	Dec. 3, 1914		

	2,062 80	Jan. 7, 1915		
	23 25	Jan. 14, 1915		
	515 70	Jan. 21, 1915		
	221 67	Feb. 11, 1915		
	5 08	Feb. 11, 1915		
	17,190 00	Feb. 25, 1915		
	480 50	Feb. 25, 1915		
	112 18	June 10, 1915		
			$71,602 68	Jan. 21, 1915
$71,602 68				
			$71,602 68	

Contract Work Under Way at Date of Last Biennial Report and Not Yet Completed.

No.	Date of contract	Description	Contractors	Contract price	Payments	Date of payments	Total
						Paid prior to July 1, 1914	$8,900 27
189	June 5, 1913	Furnishing electric light and power for the Union Depot and Ferry House for three years.	City Electric Co.	Prices as per bid on file in secretary's office.	$988 10	July 10, 1914	
					881 90	July 10, 1914	
					979 60	Sept. 11, 1914	
					2,002 64	Oct. 8, 1914	
					1,092 86	Dec. 10, 1914	
					1,118 56	Jan. 7, 1915	
					1,300 56	Feb. 9, 1915	
					1,280 32	Mar. 10, 1915	
					1,298 32	Mar. 10, 1915	
					1,359 86	April 8, 1915	
					1,271 18	May 10, 1915	
					1,274 06	June 10, 1915	
					1,019 22	July 15, 1915	
					1,092 90	Aug. 12, 1915	
					1,173 06	Oct. 14, 1915	
					1,119 76	Oct. 21, 1915	
					1,225 00	Nov. 18, 1915	
					1,378 02	Dec. 16, 1915	
					1,469 74	Jan. 13, 1916	
					1,063 10	Feb. 17, 1916	
					807 00	Mar. 23, 1916	
					766 54	April 13, 1916	
					670 48	May 8, 1916	
					702 74	June 8, 1916	
							$27,335 52
							$36,235 79
						Paid prior to July 1, 1914	$14,889 55
190	June 19, 1913	Furnishing electric light and power for all buildings except Union Depot and Ferry House and for water front for three years.	Pacific Gas and Electric Co.	Prices as per bid on file in secretary's office.	$2,522 16	Aug. 20, 1914	
					1,420 47	Sept. 11, 1914	
					1,272 95	Oct. 8, 1914	
					2,877 72	Dec. 10, 1914	
					1,393 35	Jan. 7, 1915	
					1,690 30	Feb. 11, 1915	

					3,473 27	Mar. 10, 1915	
					1,601 42	April 8, 1915	
					1,269 74	May 13, 1915	
					1,338 54	June 17, 1915	
					1,237 01	July 13, 1915	
					1,281 23	Aug. 12, 1915	
					5,021 95	Nov. 26, 1915	
					2,331 53	Dec. 16, 1915	
					2,260 62	Jan. 13, 1916	
					2,347 77	Mar. 9, 1916	
					2,094 38	Mar. 16, 1916	
					2,107 64	April 13, 1916	
					1,669 46	May 8, 1916	
					1,632 21	June 15, 1916	40,843 72
							$55,733 27

Work Contracted For and Completed Within the Biennial Term July 1, 1914, to June 30, 1916.

No.	Date of contract	Description	Contractors	Contract price	Payments	Date of payments	Total	Date of completion
215	July 9, 1914	Constructing two passenger ferry slips, Nos. 9 and 10.	Healy-Tibbitts Construction Co.	$91,700 00	$6,189 75	Sept. 3, 1914		
				(Extras) 10,647 62	465 91	Oct. 8, 1914		
					13,067 25	Oct. 8, 1914		
					10,316 25	Nov. 5, 1914		
					4,509 62	Nov. 12, 1914		
					19,944 75	Dec. 3, 1914		
					3,513 44	Dec. 10, 1914		
					99 52	Jan. 7, 1915		
					11,004 00	Jan. 7, 1915		
					165 60	Jan. 14, 1915		
					8,253 00	Jan. 28, 1915		
					656 25	Feb. 11, 1915		
					22,925 00	Mar. 4, 1915		
					650 48	Mar. 11, 1915		
					313 77	Mar. 11, 1915		
					98 73	April 15, 1915		
					111 76	May 20, 1915		
					12 20	June 17, 1915		
					50 34	Aug. 12, 1915		
							102,347 62	Jan. 28, 1915
				$102,347 62				
216	July 9, 1914	Constructing Pier No. 35	Healy-Tibbitts Construction Co.	$386,300 00	$691 15	Sept. 17, 1914		
				Add for extra concrete piling 184 88	15,934 87	Oct. 8, 1914		
					11,589 00	Nov. 5, 1914		
					10,140 38	Jan. 7, 1915		
					18,832 12	Feb. 4, 1915		
				$386,484 88	62 32	Feb. 11, 1915		
				Deduct for shorter concrete piles 2,819 19	30,421 13	Mar. 4, 1915		
					14 64	Mar. 11, 1915		
					34,767 00	April 8, 1915		
					57,945 00	May 6, 1915		
				$383,665 69	765 43	May 13, 1915		
				(Extras) 51,839 59	26,075 25	June 3, 1915		
					627 37	June 3, 1915		
				$435,505 28	945 31	June 17, 1915		
					28,972 50	July 8, 1915		
					631 20	July 15, 1915		
					852 55	July 22, 1915		

						3,545 35	Aug. 5, 1915		
						17,383 50	Aug. 5, 1915		
						3,865 47	Aug. 19, 1915		
						181 13	Aug. 19, 1915		
						4,200 81	Aug. 26, 1915		
						5,421 76	Sept. 2, 1915		
						28,972 50	Sept. 2, 1915		
						14 44	Sept. 10, 1915		
						4,578 29	Sept. 10, 1915		
						2,018 04	Sept. 16, 1915		
						817 35	Sept. 23, 1915		
						5,794 50	Oct. 7, 1915		
						2,897 25	Nov. 11, 1915		
						114 10	Nov. 26, 1915		
						9,858 21	Dec. 9, 1915		
						84,075 00	Dec. 16, 1915		
						447 60	Jan. 13, 1916		
						1,920 38	Jan. 27, 1916		
						2,439 48	Feb. 3, 1916		
					$435,505 28	$417,812 38			
						7,762 46	Mar. 2, 1916		
						9,865 69	June 15, 1916		
						64 75	June 15, 1916		
					$435,505 28			$435,505 28	June 15, 1916
217	Aug. 20, 1914	Constructing Slip No. 7, reconstructing a portion of Slip No. 6, and constructing a foundation for the extension of the Ferry Building.	San Francisco Bridge Co.		$51,400 00	$59 00	Oct. 8, 1914		
				(Extras)	7,040 44	6,939 00	Oct. 8, 1914		
						3,084 00	Nov. 5, 1914		
						6,553 50	Dec. 3, 1914		
						638 25	Dec. 24, 1914		
						13,492 50	Jan. 7, 1915		
						1,460 26	Jan. 21, 1915		
						8,481 00	Jan. 28, 1915		
						3,975 21	Feb. 11, 1915		
						871 98	Feb. 11, 1915		
						12,830 00	Mar. 4, 1915		
						35 74	Mar. 4, 1915		
					$58,440 44			$58,440 44	Jan. 28, 1915

Work Contracted For and Completed Within the Biennial Term July 1, 1914, to June 30, 1916—Continued.

No.	Date of contract	Description	Contractors	Contract price	Payments	Date of payments	Total	Date of completion
218	Sept. 3, 1914	Repairing Pier No. 23	Hyde Harjes & Co.	$10,865 00				
				Additions 5,494 52				
				$16,359 52	$5,739 93	Nov. 5, 1914		
				(Extras) 5,249 45	4,940 40	Dec. 3, 1914		
					1,589 31	Jan. 7, 1915		
					5,249 45	Jan. 14, 1915		
					4,089 88	Feb. 11, 1915		
				$21,608 97			$21,608 97	Jan. 7, 1915
219	Sept. 17, 1914	Constructing Pier No. 37 and adjacent bulkhead wharf and shed.	Healy-Tibbitts Construction Co.	$204,300 00	$22,983 75	Nov. 5, 1914		
				(Extras) 6,834 10	18,387 00	Dec. 3, 1914		
					286 19	Dec. 10, 1914		
					162 32	Jan. 7, 1915		
					16,854 75	Jan. 7, 1915		
					29,112 75	Feb. 4, 1915		
					29,112 75	Mar. 4, 1915		
					164 21	Mar. 11, 1915		
					13,790 25	April 8, 1915		
					24 56	April 15, 1915		
					2,064 68	April 15, 1915		
					10,725 75	May 6, 1915		
					1,149 71	May 13, 1915		
					12,258 00	June 3, 1915		
					198 02	June 17, 1915		
					1,144 13	June 17, 1915		
					51,075 00	July 8, 1915		
					937 28	Aug. 12, 1915		
					283 24	Aug. 26, 1915		
					419 76	Sept. 16, 1915		
				$211,134 10			$211,134 10	June 3, 1915
220	Sept. 25, 1914	Laying basalt block pavement in Fremont street, between Brannan street and The Embarcadero, and in Main street, between Bryant street and The Embarcadero.	J. G. Harney	$10,947 25	$8,101 05	Nov. 19, 1914		
				Reductions 145 85	2,700 35	Dec. 24, 1914		
				$10,801 40	238 96	Jan. 7, 1915		
				(Extras) 294 26	55 30	Jan. 7, 1915		
				$11,095 66			$11,095 66	Nov. 19, 1914

221	Oct. 15, 1914	Constructing Pier No. 16 and shed; also shed over adjacent bulkhead wharf.	Healy-Tibbitts Construction Co.		$108,720 00	$5,707 80	Dec. 3, 1914		
				(Extras)	8,454 24	393 27	Dec. 10, 1914		
						14,677 20	Jan. 7, 1915		
						12,231 00	Feb. 4, 1915		
						302 32	Feb. 11, 1915		
						16,308 00	Mar. 4, 1915		
						904 45	Mar. 11, 1915		
						20,385 00	April 8, 1915		
						2,333 25	April 15, 1915		
						8,154 00	May 6, 1915		
						1,321 22	May 20, 1915		
						138 56	May 20, 1915		
						4,077 00	May 20, 1915		
						27,180 00	June 24, 1915		
						1,933 25	July 1, 1915		
						103 30	July 22, 1915		
						557 34	Aug. 26, 1915		
						467 28	Nov. 26, 1915		
						467 28	Nov. 26, 1915		
					$117,174 24			$117,174 24	May 20, 1915
222	Oct. 22, 1914	Constructing foundation for the post office.	Healy-Tibbitts Construction Co.		$27,690 00	$6,437 92	Dec. 3, 1914		
				(Extras)	4,291 50	4,361 18	Jan. 7, 1915		
						1,349 89	Feb. 4, 1915		
						1,349 89	Mar. 4, 1915		
						21 35	Mar. 11, 1915		
						81 39	Mar. 11, 1915		
						6,230 25	April 8, 1915		
						492 04	April 15, 1915		
						2,089 35	April 22, 1915		
						186 92	April 29, 1915		
						1,038 37	May 6, 1915		
						144 30	May 13, 1915		
						359 81	May 27, 1915		
						6,922 50	June 10, 1915		
						41 27	June 17, 1915		
						875 07	July 8, 1915		
					$31,981 50			$31,981 50	May 6, 1915
223	Oct. 22, 1914	Constructing Pier No. 18 and shed; also shed over adjacent bulkhead wharf.	San Francisco Bridge Co.		$111,800 00	$1,677 00	Dec. 3, 1914		
				(Extras)	11,426 44	11,739 00	Jan. 7, 1915		
						9,642 75	Feb. 4, 1915		
						54 50	Feb. 18, 1915		
						18,866 25	Mar. 4, 1915		

Work Contracted For and Completed Within the Biennial Term July 1, 1914, to June 30, 1916—Continued.

No.	Date of contract	Description	Contractors	Contract price	Payments	Date of payments	Total	Date of completion
223	Oct. 22, 1914	Constructing Pier No. 18 and shed; also shed over adjacent bulkhead wharf.	San Francisco Bridge Co.		$25,155 00	April 8, 1915		
					874 66	May 6, 1915		
					2,435 05	May 6, 1915		
					6,708 00	May 6, 1915		
					5,869 50	June 3, 1915		
					4,192 50	June 17, 1915		
					1,049 15	July 1, 1915		
					5,190 00	July 22, 1915		
					27,950 00	July 22, 1915		
					1,154 75	July 29, 1915		
					668 33	Oct. 28, 1915		
				$123,226 44			$123,226 44	June 17, 1915
224	Nov. 12, 1914	Furnishing lumber for one year	Loop Lumber Co.	Prices as per bid on file in secretary's office.	$1,763 53	Jan. 11, 1915		
					1,722 18	Feb. 9, 1915		
					413 11	Feb. 9, 1915		
					2,388 00	Mar. 10, 1915		
					154 49	Mar. 10, 1915		
					2,171 30	April 8, 1915		
					918 05	April 8, 1915		
					3,396 44	May 10, 1915		
					1,399 61	May 10, 1915		
					2,887 57	June 8, 1915		
					2,389 32	June 8, 1915		
					2,481 27	July 15, 1915		
					1,231 82	July 15, 1915		
					2,630 14	Aug. 12, 1915		
					2,782 06	Sept. 7, 1915		
					842 52	Sept. 7, 1915		
					2,139 38	Oct. 7, 1915		
					893 87	Oct. 7, 1915		
					3,028 17	Nov. 8, 1915		
					2,852 79	Dec. 9, 1915		
					397 41	Dec. 9, 1915		
					559 13	Dec. 23, 1915		
							$39,472 16	Dec. 6, 1915

227	Nov. 27, 1914	Cleaning The Embarcadero	J. G. Harney	Districts 1, 2, 3, 4, 5a, 5b, 6a, 6b, 8, 9, 10, 11, and 12, 65 cents for 1,000 sq. yards; District 7, 85 cents for 1,000 sq. yards.		$847 45	Jan. 11, 1915		
						874 32	Feb. 9, 1915		
						608 42	Mar. 10, 1915		
						1,337 67	April 1, 1915		
						1,429 68	May 10, 1915		
						1,282 34	June 3, 1915		
						1,614 11	July 1, 1915		
						1,628 54	Aug. 5, 1915		
						1,595 11	Sept. 7, 1915		
						1,560 80	Oct. 7, 1915		
						1,572 80	Nov. 8, 1915		
						1,066 39	Dec. 2, 1915		
								$15,417 63	Nov. 30, 1914
228	Nov. 27, 1914	Constructing wood block pavement on Piers Nos. 16, 18, and 37.	Rolph-Mills & Co.		$18,275 00	$7,500 00	April 8, 1915		
				(Extras)	587 14	6,206 25	May 6, 1915		
						587 14	May 6, 1915		
						4,568 75	June 10, 1915		
					$18,862 14			$18,862 14	May 6, 1915
229	Nov. 19, 1914	Constructing extension of the Ferry Building.	Construction and Engineering Co.		$37,400 00	$650 56	Dec. 17, 1914		
				(Extras)	4,018 55	8,415 00	Jan. 7, 1915		
				(Bonus)	8,200 00	39 54	Jan. 14, 1915		
						14,586 00	Feb. 4, 1915		
						507 01	Feb. 16, 1915		
						5,049 00	Feb. 26, 1915		
						8,200 00	Mar. 11, 1915		
						286 33	April 1, 1915		
						2,531 08	April 1, 1915		
						9,350 00	April 1, 1915		
						4 03	April 8, 1915		
						4 03	April 8, 1915		
					$49,618 55			$49,618 55	Feb. 26, 1915
230	Dec. 3, 1914	Furnishing steel rolling doors on sheds on Piers 16, 18, and 37.	Kinnear Manufacturing Co.		$28,509 00	$12,344 06	April 8, 1915		
					21,945 00	6,414 52	April 8, 1915		
				(Extras)	626 50	8,552 71	May 6, 1915		
						2,468 81	May 6, 1915		
						395 91	May 27, 1915		
						5,879 98	June 3, 1915		
						2 32	June 10, 1915		
						1,645 88	June 17, 1915		
						534 54	June 17, 1915		

Work Contracted For and Completed Within the Biennial Term July 1, 1914, to June 30, 1916—Continued.

No.	Date of contract	Description	Contractors	Contract price	Payments	Date of payments	Total	Date of completion
230	Dec. 3, 1914	Furnishing steel rolling doors on sheds on Piers 16, 18 and 37.	Kinnear Manufacturing Co.		$228 27	July 1, 1915		
					5,486 25	July 22, 1915		
					7,127 25	July 22, 1915		
				$51,080 50			$51,080 50	June 17, 1915
231	Dec. 10, 1914	Furnishing steel frame for the post office.	Pacific Rolling Mill Co.	$18,395 00	$8,277 75	Mar. 4, 1915		
				(Extras) 306 58	5,518 50	May 6, 1915		
				Bonus 800 00	800 00	May 20, 1915		
					306 58	June 10, 1915		
					4,598 75	June 10, 1915		
				$19,501 58			$19,501 58	April 30, 1915
234	Jan. 21, 1915	Constructing Pier No. 24 and shed over same; also shed over the adjacent bulkhead wharf.	Healy-Tibbitts Construction Co.	$98,300 00	$7,372 50	April 8, 1915		
				(Extras) 5,344 35	22,117 50	May 6, 1915		
					1,006 99	May 20, 1915		
					14,745 00	June 3, 1915		
					467 92	July 1, 1915		
					195 61	July 1, 1915		
					16,219 50	July 8, 1915		
					1,045 60	July 15, 1915		
					5,898 00	Aug. 5, 1915		
					4,423 50	Sept. 2, 1915		
					1,090 32	Sept. 16, 1915		
					2,949 00	Sept. 16, 1915		
					23,575 00	Oct. 21, 1915		
					924 38	Nov. 11, 1915		
					613 44	Nov. 18, 1915		
				$103,644 35			$102,644 35 1,000 00	Sept. 16, 1915 (Held pending settlement of claim for damages.)
235	Feb. 4, 1915	Constructing building for Wells Fargo & Company.	Fred L. Hansen	$38,946 00	$14,604 75	April 8, 1915		
				(Extras) 2,089 52	4,381 42	May 6, 1915		
				Bonus 1,300 00	1,682 00	May 20, 1915		
					10,223 33	May 20, 1915		
					1,300 00	May 27, 1915		

						201 90	June 10, 1915		
						9,736 50	June 24, 1915		
						205 62	July 29, 1915		
					$42,335 52			$42,335 52	May 20, 1915
236	Feb. 25, 1915	Repairing Pier No. 21	San Francisco Bridge Co.		$11,887 00	$3,218 25	April 8, 1915		
				Additions	1,101 65	5,145 55	May 6, 1915		
						1,377 69	May 20, 1915		
					$12,988 65	217 50	May 20, 1915		
				(Extras)	4,322 85	4,105 35	May 27, 1915		
						3,247 16	June 24, 1915		
					$17,311 50			$17,311 50	May 20, 1915
237	Mar. 25, 1915	Furnishing piles for one year	Hammond Lumber Co.	12″ and 13″ piles, 10 cents per foot; 14″ and 15″ piles, 11 cents per foot; 16″, 17″ and 18″ piles, 12 cents per foot.		$2,824 30	June 10, 1915		
						2,611 80	July 15, 1915		
						1,384 44	Aug. 5, 1915		
						2,508 36	Sept. 9, 1915		
						1,447 24	Oct. 7, 1915		
						1,680 39	Nov. 8, 1915		
						2,428 08	Dec. 9, 1915		
						2,983 80	Jan. 6, 1916		
						2,317 80	Feb. 8, 1916		
						996 96	Feb. 8, 1916		
						2,451 72	Mar. 9, 1916		
						2,571 84	April 6, 1916		
						1,629 40	May 8, 1916		
								$27,836 13	April 30, 1916
238	Mar. 25, 1915	Constructing post office	Teichert & Ambrose		$74,891 00	$5,055 14	May 6, 1915		
				(Extras)	2,453 35	11,795 33	June 3, 1915		
						19,658 89	July 8, 1915		
						14,042 06	Aug. 5, 1915		
						5,616 83	Aug. 14, 1915		
						29 48	Sept. 2, 1915		
						18,722 75	Sept. 16, 1915		
						2,423 87	Nov. 18, 1915		
					$77,344 35			$77,344 35	Aug. 14, 1915

Work Contracted For and Completed Within the Biennial Term July 1, 1914, to June 30, 1916—Continued.

No.	Date of contract	Description	Contractors	Contract price		Payments	Date of payments	Total	Date of completion
240	May 13, 1915	Constructing steam heating system for post office.	Carl T. Doell		$4,746 00	$533 92	June 10, 1915		
				(Extras)	33 36	1,957 73	July 8, 1915		
						711 90	Aug. 5, 1915		
						355 95	Sept. 2, 1915		
						1,186 50	Oct. 7, 1915		
						33 36	Feb. 10, 1916		
					$4,779 36			$4,779 36	Sept. 2, 1915
241	May 13, 1915	Installing steel rolling doors on shed on Pier No. 24.	C. Jorgensen & Co.		$10,450 00	$7,837 50	Sept. 10, 1915		
				(Extras)	189 75	2,612 50	Oct. 14, 1915		
						189 75	Nov. 11, 1915		
					$10,639 75			$10,639 75	Sept. 10, 1915
244	June 24, 1915	Constructing wood block pavement on Pier No. 24.	Rolph-Mills & Co.		$4,800 00	$3,600 00	Sept. 10, 1915		
						1,200 00	Oct. 14, 1915		
					$4,800 00			$4,800 00	Sept. 10, 1915
245	June 24, 1915	Constructing four side aprons for upper deck landings of passenger ferry slips Nos. 6, 7, and 8.	Healy-Tibbitts Construction Co.		$13,000 00	$4,875 00	Oct. 7, 1915		
				(Extras)	317 25	1,950 00	Nov. 4, 1915		
						2,925 00	Dec. 2, 1915		
						3,250 00	Jan. 6, 1916		
						317 25	Feb. 3, 1916		
					$13,317 25			$13,317 25	Dec. 2, 1915
246	July 1, 1915	Constructing addition to Pier No. 20 and shed over same.	Healy-Tibbitts Construction Co.		$9,421 00	$5,299 31	Nov. 4, 1915		
				(Extras)	8,622 53	41 61	Nov. 4, 1915		
						1,220 60	Nov. 26, 1915		
						1,766 44	Dec. 2, 1915		
						841 38	Jan. 6, 1916		
						2,355 25	Jan. 6, 1916		
						241 26	Jan. 27, 1916		
						6,277 68	Jan. 27, 1916		
					$18,043 53			$18,043 53	Dec. 2, 1915
247	July 8, 1915	Removing car ferry slips, aprons, and hoisting apparatus and houses over aprons, foot of Lombard street.	Healy-Tibbitts Construction Co.		$1,700 00	$60 85	Oct. 21, 1915		
				(Extras)	60 85	1,275 00	Oct. 21, 1915		
						425 00	Nov. 26, 1915		
					$1,760 85			$1,760 85	Oct. 21, 1915

248	July 22, 1915	Repairing Pier No. 11	Healy-Tibbitts Construction Co.		$14,281 00	$7,815 75	Sept. 2, 1915		
				Additions	5,750 76	1,584 01	Sept. 23, 1915		
						6,230 80	Oct. 7, 1915		
					$20,031 76	977 27	Oct. 28, 1915		
				(Extras)	4,496 77	1,122 35	Nov. 4, 1915		
						1,790 41	Nov. 26, 1915		
						5,007 94	Dec. 2, 1915		
					$24,528 53			$24,528 53	Oct. 28, 1915
250	Aug. 19, 1915	Constructing Pier No. 22 and shed over same.	Tibbitts-Pacific Co.		$48,877 00	$5,498 66	Oct. 7, 1915		
				(Extras)	3,927 05	14,663 10	Nov. 4, 1915		
						610 62	Nov. 18, 1915		
						5,498 66	Dec. 2, 1915		
						3,665 78	Jan. 6, 1916		
						468 92	Jan. 13, 1916		
						109 27	Jan. 13, 1916		
						637 34	Feb. 3, 1916		
						1,832 89	Feb. 3, 1916		
						40 80	Feb. 10, 1916		
						2,566 04	Mar. 2, 1916		
						2,932 62	Mar. 16, 1916		
						494 24	Mar. 16, 1916		
						644 17	April 6, 1916		
						788 98	April 13, 1916		
						12,219 25	April 20, 1916		
						132 71	April 27, 1916		
					$52,804 05			$52,804 05	Mar. 16, 1916
252	Sept. 30, 1915	Constructing shed on Pier No. 35 and adjacent bulkhead wharf.	Healy-Tibbitts Construction Co.		$74,722 00	$22,416 60	Jan. 6, 1916		
				Deduct for		25 12	Jan. 13, 1916		
				omitting		5,604 15	Feb. 3, 1916		
				painting		14,010 37	Mar. 2, 1916		
				front of		5,604 15	April 6, 1916		
				bulkhead		87 51	April 20, 1916		
				building	200 00	5,604 15	May 4, 1916		
						2,802 08	May 18, 1916		
					$74,522 00	59 02	May 25, 1916		
				(Extras)	1,546 24	546 12	June 15, 1916		
						828 47	June 22, 1916		
						18,480 50	June 22, 1916		
					$76,068 24			$76,068 24	May 18, 1916

Work Contracted For and Completed Within the Biennial Term, July 1, 1914 to June 30, 1916—Concluded.

No.	Date of contract	Description	Contractors	Contract price	Payments	Date of payments	Total	Date of completion
253	Oct. 7, 1915	Installing steel rolling doors on shed, Pier No. 22.	Kinnear Manufacturing Co.	$6,330 00 $6,330 00	$4,747 50 1,582 50	Mar. 16, 1916 April 20, 1916	$6,330 00	Mar. 16, 1916
256	Nov. 11, 1915	Constructing wood block pavement on Pier No. 22.	St. Paul and Tacoma Lumber Co.	$2,194 50 $2,194 50	$1,645 87 548 63	Mar. 16, 1916 April 20, 1916	$2,194 50	Mar. 16, 1916
258	Dec. 9, 1915	Constructing launch offices between Piers Nos. 14 and 16, and addition thereto.	Wm. A. Newsom	$9,666 00 Addition 1,836 55 $11,502 55	$2,537 32 1,812 38 2,174 85 724 95 2,416 50 1,377 41 459 14	Jan. 6, 1916 Feb. 3, 1916 Mar. 2, 1916 Mar. 9, 1916 April 13, 1916 May 4, 1916 June 15, 1916	$11,502 55	June 15, 1916
259	Dec. 9, 1915	Paving portion of "The Embarcadero" between Brannan and Harrison streets.	Karl Ehrhart	$11,294 50 Additions 9 50 $11,304 00 (Extras) 51 41 $11,355 41	$4,162 87 4,315 13 51 41 2,826 00	Jan. 6, 1916 Feb. 3, 1916 Mar. 2, 1916 Mar. 9, 1916	$11,355 41	Feb. 3, 1916

Work Contracted For and Not Completed Within the Biennial Term, July 1, 1914, to June 30, 1916.

No.	Date of contract	Description	Contractors	Contract price		Payments	Date of payments	Total
242	June 3, 1915	Furnishing cement for one year. (Continued for another year.)	Pacific-Portland Cement Co.	Per barrel	$1 64	$5,934 80	July 1, 1915	
						8,528 00	Aug. 5, 1915	
						4,100 00	Sept. 7, 1915	
						2,583 00	Oct. 7, 1915	
						2,984 80	Nov. 8, 1915	
						2,140 20	Dec. 2, 1915	
						5,412 00	Jan. 6, 1916	
						2,320 60	Feb. 8, 1916	
						3,558 80	Mar. 2, 1916	
						9,635 00	April 6, 1916	
						6,158 20	May 8, 1916	
						10,053 20	June 8, 1916	
								$63,408 60
243	June 17, 1915	Furnishing creosoted piles	The J. M. Colman Company.	Prices as per bid on file in secretary's office.		$7,764 76	Aug. 12, 1915	
						6,460 39	Sept. 16, 1915	
						2,588 25	Sept. 16, 1915	
						4,118 41	Sept. 30, 1915	
						3,224 45	Oct. 14, 1915	
						2,153 46	Oct. 21, 1915	
						1,372 80	Nov. 4, 1915	
						1,074 82	Nov. 18, 1915	
						8,794 17	Dec. 23, 1915	
						2,931 39	Jan. 27, 1916	
						45 00	Feb. 24, 1916	
						7,036 81	Mar. 2, 1916	
						1,661 04	Mar. 2, 1916	
						30 00	Mar. 9, 1916	
						3,300 85	Mar. 23, 1916	
						35 00	April 6, 1916	
						553 68	April 6, 1916	
						2,345 60	April 6, 1916	
						10 00	April 20, 1916	
						9,091 93	April 20, 1916	
						1,100 29	April 27, 1916	
						2,811 61	May 4, 1916	
						37 50	May 25, 1916	
						3,030 65	May 25, 1916	

Work Contracted For and Not Completed Within the Biennial Term, July 1, 1914, to June 30, 1916—Continued.

No.	Date of contract	Description	Contractors	Contract price	Payments	Date of payments	Total
243	June 17, 1915	Furnishing creosoted piles	The J. M. Colman Co.		$937 20	June 8, 1916	
					7,828 86	June 15, 1916	
					42 50	June 22, 1916	
							$80,381 42
249	Aug. 5, 1915	Furnishing fuel oil for two years	Shell Co. of California	58 cents per barrel	$1,143 69	Sept. 7, 1915	
					1,881 65	Oct. 7, 1915	
					691 16	Nov. 8, 1915	
					2,310 82	Dec. 7, 1915	
					2,483 68	Jan. 6, 1916	
					4,006 52	Feb. 8, 1916	
					2,204 67	Mar. 9, 1916	
					2,420 29	April 6, 1916	
					2,175 46	May 8, 1916	
					2,332 86	June 8, 1916	
							$21,650 80
255	Nov. 18, 1915	Repairing Pier No. 9 and constructing bulkhead wharf and bulkhead building adjacent thereto.	Healy-Tibbitts Construction Co.	$63,616 00	$1,710 00	Jan. 6, 1916	
				(Extras) 4,611 46	5,081 63	Jan. 6, 1916	
					396 30	Jan. 13, 1916	
					1,140 00	Feb. 3, 1916	
					9,836 10	Feb. 3, 1916	
					1,357 93	Feb. 17, 1916	
					570 00	Mar. 2, 1916	
					5,846 27	Mar. 2, 1916	
					2,154 13	Mar. 16, 1916	
					1,450 92	April 6, 1916	
					8,265 00	April 6, 1916	
					13 68	April 13, 1916	
					529 11	April 13, 1916	
					2,503 74	May 4, 1916	
					7,980 00	May 4, 1916	
					89 37	May 18, 1916	
					70 94	May 18, 1916	
					3,990 00	June 1, 1916	
					1,026 54	June 1, 1916	
				$68,227 46			$54,011 66

257	Nov. 18, 1915	Constructing Pier No. 29 and adjacent bulkhead wharf.	Clinton Construction Co.		$283,230 00	$19,118 02	Jan. 6, 1916	
						10,621 13	Feb. 3, 1916	
						16,993 80	Mar. 2, 1916	
						29,739 15	April 6, 1916	
						31,863 37	May 4, 1916	
						25,490 70	June 1, 1916	
								$133,826 17
260	Dec. 16, 1915	Constructing wood block pavement on Pier No. 35.	Pacific Creosoting Co.		$7,850 00			
261	Dec. 16, 1915	Furnishing lumber for one year	James H. Hardy, Inc.	Prices as per bid on file in secretary's office.		$1,140 15	Jan. 6, 1916	
						904 32	Feb. 3, 1916	
						1,431 36	Feb. 8, 1916	
						1,628 25	Mar. 9, 1916	
						602 42	Mar. 10, 1916	
						2,078 60	April 6, 1916	
						445 51	April 6, 1916	
						694 25	May 4, 1916	
						1,631 16	May 4, 1916	
						33 61	June 1, 1916	
						1,720 32	June 5, 1916	
								$12,309 95
263	Dec. 23, 1915	Installing street rolling doors on shed, Pier No. 35.	United States Metal Products Co.		$18,350 00	$10,321 87	May 11, 1916	
								$10,321 87
264	Dec. 23, 1915	Cleaning the Embarcadero for one year	J. G. Harvey	Districts 1, 2, 3, 4, 5A, 5B, 6A, 6B, 8, 9, 10, 11 and 12, 51 cents each 1,000 square yards; district 7, 63 cents each 1,000 square yards.		$984 73	Jan. 13, 1916	
						670 99	Feb. 8, 1916	
						796 23	Mar. 2, 1916	
						1,453 03	April 6, 1916	
						1,648 70	May 4, 1916	
						1,644 12	June 1, 1916	
								$7,197 80
					$99,317 00	$2,623 50	May 4, 1916	

Work Contracted For and Not Completed Within the Biennial Term, July 1, 1914 to June 30, 1916—Concluded.

No.	Date of contract	Description	Contractors	Contract price		Payments	Date of payments	Total
266	Mar. 1, 1916	Repairing Pier No. 13 and constructing bulkhead wharf and bulkhead building adjacent thereto.	Healy-Tibbitts Construction Co.	(Extras)	$58 76	$2,797 60	May 4, 1916	
						58 76	May 18, 1916	
						5,010 79	June 1, 1916	
						1,865 08	June 1, 1916	
					$99,375 76			$12,355 73
267	Mar. 30, 1916	Making repairs and additions to Pier No. 44.	S. B. Peterson Co.		$28,950 00	$3,567 82	June 1, 1916	
				(Extras)	455 27	212 52	June 1, 1916	
						455 27	June 8, 1916	
					$29,405 27			$4,235 61
268	April 20, 1916	Furnishing piles for three years	Hammond Lumber Co.	12″ and 13″ piles, 11 cents per foot; 14″ and 15″ piles, 13 cents per foot; 16″, 17″ and 18″ piles, 14 cents per foot.		$1,285 90	June 15, 1916	
						655 34	June 15, 1916	
								$1,941 24
270	May 11, 1916	Furnishing six-wheeled switching locomotive engine.	Baldwin Locomotive Works.		$19,500 00			
271	May 25, 1916	Making alterations and additions to Pier No. 38.	Healy-Tibbitts Construction Co.		$22,135 00			

PRELIMINARY REPORT

OF THE

California Historical Survey Commission

FEBRUARY, 1917

CALIFORNIA
STATE PRINTING OFFICE
SACRAMENTO

27680

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LETTER OF TRANSMITTAL.

To His Excellency,
HIRAM W. JOHNSON, *Governor,*
Sacramento, California.

SIR: Herewith is presented the report of the California Historical Survey Commission, giving an account of its work from the date of organization, October 9, 1915, to December 1, 1916.

Respectfully submitted,

JOHN F. DAVIS, Chairman.
HERBERT E. BOLTON.
JAMES M. GUINN.

OWEN C. COY, Secretary and Archivist.
San Francisco, January 4, 1917.

PART I.

INTRODUCTORY STATEMENT.

INTRODUCTORY STATEMENT.

History and Organization of the Commission.

On June 12, 1915, the Governor gave his approval to an act by which there was created a state commission having as its purpose the making of a survey of local historical material in the state of California. By this action our commonwealth was placed among those progressive states which, by legislative enactment and appropriation, have shown themselves actively interested in the discovery and preservation of documents relating to their local history. Long ago the older Atlantic states saw the importance of collecting and publishing documents relating to their colonial and early state history, while during recent years the states of the South and Middle West have taken up similar work.

The statute creating the California Historical Survey Commission reads as follows:

> SECTION 1. There is hereby established a California historical survey commission composed of three members to be chosen as hereinafter provided.
>
> SEC. 2. The members of this commission shall be appointed by the Governor of the state of California; *provided,* only that one of the members of said commission shall be nominated by board of regents of the University of California, and that one of the members of said commission shall be nominated by the board of grand officers of the order of Native Sons of the Golden West; all nominations, however, shall be subject to approval by the Governor.
>
> SEC. 3. The commissioners first named shall be appointed for terms ending July 1, 1916, and their successors shall be appointed for a term of two years; the said commissioners to serve without salary.
>
> SEC. 4. The purpose of this commission shall be to make a survey of the material on local history within the state of California by investigating documents in local depositories and in the possession of private individuals and other sources of original information on the early history of the state of California and to compile and keep a record of such sources of information.
>
> SEC. 5. This commission shall have power to organize the work of the commission; to appoint such assistants as it shall deem necessary and to fix their compensation; and to spend such other moneys as it may deem advisable, but no expenditure of money by the commission shall exceed the amount appropriated by this act; to make and enforce rules governing this commission and to do such other things as shall be necessary to carry out the provisions and the purpose of this act.
>
> SEC. 6. This commission shall meet at such times and places within the state of California, as may be expedient and necessary for the proper performance of its duties, such times and places to be designated and determined by this commission.
>
> SEC. 7. The sum of ten thousand dollars or so much thereof as may be necessary, is hereby appropriated out of any money in

the state treasury, not otherwise appropriated, to be expended in accordance with law for the purposes of this act.

In accordance with the provisions of the act the members of the commission were appointed as follows: John F. Davis, then Grand President of the Native Sons of the Golden West, San Francisco; Herbert E. Bolton, Professor of American History in the University of California, Berkeley; and James M. Guinn, Secretary and Curator of the Southern California Historical Society, Los Angeles.

The organization of the commission was completed at a meeting of its members held in San Francisco, October 9, 1915, at which time Commissioner John F. Davis was chosen chairman and Owen C. Coy, of Berkeley, appointed to the position of secretary and archivist and entrusted with the general supervision of the field work of the commission. An advisory committee of persons chosen on account of their recognized ability and experience in dealing with the materials of California history was also named. The members of this committee are: Dr. H. Morse Stephens, Sather Professor of History at the University of California, Berkeley; Dr. Ephraim D. Adams, Professor of History at Stanford University, Palo Alto; Rev. Joseph M. Gleason, Member of the American Historical Association, Palo Alto; Dr. Rockwell D. Hunt, Professor of Economics and History at the University of Southern California, Los Angeles; Mrs. Margaret V. Allen, Secretary of the Pioneer and Historical Society, San Diego; Dr. Charles E. Chapman, Assistant Professor of California History at the University of California, Berkeley; Miss Eudora Garoutte, California Department, State Library, Sacramento; and Mr. Charles B. Turrill, San Francisco.

Purpose and Method of the Work.

Although it may be unnecessary to make mention of the fact, nevertheless in the interest of a clear understanding of the work it should be said that the Historical Survey Commission is not writing a history of the state nor is it engaged in the collection of historical documents. Its work as set forth in section 4 of the act creating the commission is to investigate documents and to compile and keep a report of such sources of information as may be found in local depositories, in the possession of individuals, or elsewhere relating to the early history of this state. Accordingly the commission has taken up a careful survey of the records of the various county archives of the state, and it is hoped as soon as this is completed to extend the work to the archives of the state and to the local federal offices. At the same time reports are being gathered from the public libraries of the state and the extensive collections owned by historical societies, and other institutions. Documents in the possession of private individuals are being listed as fast as time and resources permit. Other sources of original information are also being investigated, among them being early newspaper files, the records of religious and social institutions and of business concerns.

Since the members of the commission are asked to serve entirely without salary, the general administration of the commission falls largely to its secretary and archivist, assisted by the various field workers. Of these latter, Mrs. Mary M. Bowman, of Los Angeles, has been engaged almost exclusively in reporting upon materials owned by the older families of southern California. During the summer months several men of experience in dealing with historical documents were employed to assist with the field work, and during the month of September, Mr. R. S. Kuykendall, of Santa Clara, a man of ability and historical training, was appointed a regular field assistant. In addition to the work of those definitely employed and paid by the commission, mention should be made of the hearty support and assistance given by the many friends of local California history without whose cooperation the work of the commission must necessarily be greatly handicapped.

Activities of the Commission.

County Archives. Up to the present time one of the chief features of the work has been in connection with the records in the county archives, which are being examined from three distinct points of view. In the first place a careful survey is being made of the records and documents in the various offices, with the object of determining their historical value and suggesting how they may be employed by students of the social sciences. In this manner every set of records or documents is examined and listed by the proper title, and the number of volumes or documents noted. A careful study is also being made of those parts of the statutes and codes which deal with these records, the results of which study will be set forth in the introduction to the archive report and will, it is believed, constitute a valuable treatise upon the history and contents of the public records, of value alike to the research worker and to the keeper of these records. During the fourteen months since the commission was organized the survey has already been extended over forty of the counties of the state and the records of nearly three hundred offices have been examined and listed. Almost without exception the investigators have been received with the utmost courtesy by the local officials, who have granted free access to the records and have in many cases assisted personally in the work.

Archive Science. In order to apply the principles of archive science, this commission, in common with similar bodies in other states, is making a study, not only of the records contained in the public offices, but also of the conditions connected with their form and preservation. Thus far too little attention has been given to this subject. While some of the county courthouses are undoubtedly fireproof, the greater number are only partially so, and many are veritable fire traps. Furthermore, while it is a felony for an official to destroy any public record entrusted to his care, an investigation of the courthouses will show that many records of value to the research worker, often involving even such vital matters as land titles, are being crowded into damp basements, dusty, mice-infested attics, or into outbuildings used for wood, oil, and even gasoline. It should, however, be said that in cases where the commission has brought these matters to the attention of the officials, boards of supervisors, or grand juries, prompt action has usually been taken to remedy the evil. Again, while it is undoubtedly true that all public officials are interested in seeing that the paper, ink, and other materials used in the records are of good quality, yet the average man does not possess the technical knowledge necessary for making proper tests along this line. The commission is gathering data and before the survey is complete expects to make a scientific examination of these materials and embody the results of the investigation in its final report. The enthusiastic manner in which this, as well as other features of the work, are received by the officers shows that its value is at once recognized.

Historical Value of Archives. Space does not permit a recital of the many facts of historical value to be found in the archives of our public offices. In many of the older counties records have been discovered that far antedate the organization of the state government. These are in many cases the records relating to land claims under the Spanish or Mexican governments, but in some of the counties they are much more extensive, dealing with the entire local administrative system. In Monterey County an interesting volume entitled "Official Consular Acts of T. O. Larkin" were discovered. The greater part of the volume is devoted to a record of the titles of property owned by Larkin or his family, but the earlier pages are given over exclusively to a record of his official acts and illustrates very clearly the varied nature of his duties. The time of transition from Mexican rule to the organized state government, was one of the most difficult periods of California history, yet in many of the counties are to be found alcaldes' books, records of the Ayuntamientos, and of the Courts of First Instance, as well as other documents which throw valuable light upon the events of these years.

For the period since 1850 the records are practically complete, and for the most part uniform in the various counties; yet the missing volumes, the variation in title and in the methods of keeping the records call for close attention. It will be unnecessary here to give a more complete account of the historical value of these local archives as that matter will be fully illustrated in a later part of this report. To express it briefly, they may be said to contain the framework of historical fact around which the substantial structure of California's political, economic, and social history must be erected.

County Archives Examined. As stated elsewhere, the archive work of the commission has been completed in more than forty counties of the state. In the southern counties the archives have been in nearly all cases examined and listed. Los Angeles and San Diego counties have been worked with good results by the secretary and archivist, while San Bernardino, Riverside and Orange counties, as well as Santa Barbara and Ventura counties were covered by assistants during the summer months. The San Joaquin Valley counties, including San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and Kern, were in like manner covered by the secretary and assistants during the spring and summer months of 1916. In the vicinity of San Francisco Bay and south, this work has been completed in Alameda, Contra Costa, San Mateo, Santa Clara, Santa Cruz, San Benito, Monterey and San Luis Obispo counties, many of these yielding good results in the older records. Among the mountain counties the work was pushed rapidly during the more pleasant summer months and practically all of these have now been reported upon, viz: Inyo, Mono, Mariposa, Tuolumne, Calaveras, El Dorado, Placer, Sierra, Plumas, Lassen, Modoc, Siskiyou and Tehama. The north bay counties have been worked as follows: Marin, Sonoma, Mendocino and Humboldt. The counties in the Sacramento Valley, with the exception of Butte, and the counties just north of San Francisco Bay have as yet not been covered in this survey, largely due to the fact that the aim has been to work the more distant or inaccessible districts first. The work is, however, now being centered in this territory and before the spring is over it is expected that the archives of these counties will also be in form to be reported. In a similar manner, Trinity, Del Norte, and Nevada counties are being reserved for special attention as soon as opportunity offers, and the offices of the city and county of San Francisco are likewise being examined. While the archive report has been given first consideration in each of the counties covered, attention has also been given to the discovery of any other classes of material embraced in the work of this survey. It is planned to have field work for the report on the county archives completed during the next few weeks, attention then being directed more especially to the report on California newspaper files and other lines of investigation. In order, however, that the energies of the commission may not be dissipated along too many lines, it has been thought desirable to make one feature of the work predominant at a time; thus far particular stress has been laid upon the investigation of the county archives.

Other Public Archives. In conjunction with the survey of county archives, an examination is being made of the records of the United States land offices and other local federal offices. The documents contained in these depositories have been found most valuable in tracing the settlement of the state, as seen in the administration of land matters and other similar activities of the general government.

Public Libraries and Collections. In addition to these depositories of official records, there must also be noted the larger collections of historical materials contained in the public libraries or in the hands of local historical societies. There are within the state several collections which are of particular importance to the student of California history. Among these should be mentioned the State Library at Sacramento, the Bancroft Collection at Berkeley, the Sutro Collection, and that of the Golden Gate Park Museum, both of San Francisco. Since these collections are fairly well known and there is little danger that the materials they contain will be destroyed or removed, and since, on the other hand, the task of listing them would entail great expense in time and money, they have not thus far been included in the work of our survey. But no survey of California historical materials can afford to leave them out of consideration. The collection of the Southern California Historical Society at Los Angeles has been examined and its contents listed. In a similar manner the Coronel Collection, also in Los Angeles, and the collection of the San Diego Pioneer and Historical Society are soon to be reported. Much material of historical value has also been discovered in local public libraries.

Documents in Private Hands. The next class of materials to be considered includes the great mass of miscellaneous documents in the possession of private individuals. The work in this field is by far the most difficult thus far taken up by the commission. For, to the popular ignorance as to what constitutes an historical document must be added a natural indifference to the work and a fear lest some action be taken to remove the document from the possession of its present owner. But in spite of the difficulties, many valuable documents have been discovered and in many cases transcribed for the future use of the commission. Among the collections of this class already examined, should be mentioned the private papers of the late Senator Bard, of Ventura County, and the Palomares and Variel collections in Los Angeles. The former contains much valuable material upon the development of the oil industry in California, while the two latter contain many most valuable Spanish documents. Other collections of great value have already been located and will be listed within a short time.

While a number of large collections have thus been located, the greater part of the material in private hands so far discovered is made up of isolated documents or manuscripts possessed by individuals or families. It is probably unnecessary to state that these are often of unique value. Among the many documents thus far discovered may be mentioned the old daybook of the firm of Shannon & Cady, at Coloma, the place of the famous gold discovery, which gives excellent illustrations of the high cost of living during the spring of 1849; the diary of Mrs. C. S. Ricks, affording an excellent picture of the social life of San Francisco and Eureka during 1853 and 1854; and the journals of Mr. Stephen Fowler, while on a whaling cruise in the Pacific in 1845–46, and again as a gold seeker in California during 1849 and the early fifties.

Pioneer Reminiscences. The gathering of personal memoirs and reminiscences is another field of operation closely associated with the one just considered. Under the personal supervision of the secretary of the commission a number of the older residents of the Humboldt Bay region were interviewed and their reminiscences recorded. In several cases valuable information was obtained in this way, but experience shows that notwithstanding the seeming great value of these stories of pioneers, they are, in fact, extremely untrustworthy as historical evidence and, unless the questioner is already familiar with the main facts, he is very apt to be led astray, the result being a hopeless mixture of historical facts and worthless fiction. However, as opportunity is offered, it will be the purpose of the commission to secure from the pioneers such statement whenever it appears that they will be especially trustworthy. The main reliance for information of this character must, however, be placed in contemporary diaries, journals, and letters, or in memoirs written by the pioneers in years now past.

Newspaper Files. In addition to the kinds of material already mentioned in this report, there are one or two other classes which should be considered. Experience has shown that in dealing with local history one of the most valuable sources of information is the local newspaper file. In view of this fact the commission is taking up as part of its regular work the compilation of a directory of newspaper files, in which will be reported the name of each paper which has been published in a community, together with a brief historical note and a complete list of the places where files of the paper may be found. This work is being done largely by correspondence with the papers of the state, most of which give the desired information promptly. Whenever it is possible this data is then checked up by the field workers, who are constantly on the alert for files of old papers around the newspaper offices, public libraries, and county archives. The large amount of this material in private hands, together with the great number of newspapers now no longer published, makes this a difficult task, but we believe its importance justifies the effort necessary to carry it to completion.

Other Historical Sources. There are also many other lines of work awaiting the attention of this commission. Upon some of these a beginning has already been made, while others must wait until a more favorable opportunity offers. The records of the religious organizations contain very valuable and interesting information regarding the development of that phase of the state's history. Father Zephyrin Engelhardt, the historian of the Franciscan missions, has offered his assistance in making a report upon the archives of the missions, which played such an important role in the early period of California's history. In a similar manner, Father J. M. Gleason, of Palo Alto, a member of the advisory committee of the commission, has already taken in hand the tabulation of a report upon the archives of the Diocese of San Francisco, and it is hoped to extend this work later to include the local church records as well. Among the Protestant denominations a beginning has also been made. News items and editorial appeals in denominational papers, together with resolutions endorsing the work adopted by the annual conferences of these organizations, have prepared the way for good results as soon as the work can be taken up more effectively. Closely allied to these records are those of fraternal and social organizations, which may later be reported in a similar manner.

Administration of Funds. Notwithstanding that the appropriation granted to this commission was small in comparison with the task before it, strict economy has made it possible to accomplish much during the few months since the work was actually begun. The overhead expenses of the commission have been kept down to the minimum, since arrangements have been made whereby office rent and many other incidental expenses have been eliminated. During the first twelve months the operating expenses of this commission have amounted to $4,929.30, divided as follows: Salary of secretary and assistants, $3,926.97; travelling expenses, $853.05; printing, $76.48; postage, $40.00; telephone, $2.63; express, $5.57; supplies, etc., $25.60. Thus it will be seen that the two items absorbing most of the funds are for salaries and traveling expenses, in considering which it should also be remembered that the members of the commission serve without salary, and that the secretary and archivist of the commission devotes a large portion of his time to field work. The funds thus are being used in so far as possible for the actual work of extending the survey into all parts of the state.

Reports of the Commission.

The complete report of this commission will probably comprise several volumes, arranged according to the classes of material considered. The results of the survey of the county archives will occupy at least one volume, in which will be given the list of records or documents found in the various county offices of the state, together with an introduction disclosing the results of the application of archive science to local conditions, and a historical analysis of the contents of the more important offices. The report upon the files of California newspapers will undoubtedly necessitate the compilation of a separate volume devoted to that phase of the work. The number of volumes occupied by the report upon the other material investigated by the commission will depend upon the amount of material discovered. In this present preliminary report no attempt is made to cover the whole field of research taken up, but it is presented merely to illustrate various phases of the work connected with the survey of the county archives. For this purpose the report is divided into three parts, including this general introduction. In the second part is given an historical analysis of the archives of the county clerk. In the third part is a full report on the archives of Humboldt County, which will serve both as a sample of the form of the report, and also as an illustration of the contents of the archives of a county in which the records have been well preserved. The report upon the contents of the office of the Recorder of the City and County of San Francisco, which is also given, has been selected for two reasons: First, to illustrate the method of reporting upon material antedating the formation of the state government; and second, to show the value of the work of the commission in cases where a large part of the records have been destroyed.

Publication of Reports and Documents.

The various features of the work of the commission thus far taken up or at present under consideration have been discussed in the earlier paragraphs. That the results of its investigation should be made accessible to the public in the form of published reports has been presumed as a matter of course, and the plan of the commission regarding the form of these reports has been set forth, notwithstanding the fact that the statute creating the commission does not specifically give it this power. It is therefore desirable that provision should be made for this either by amending the act or by means of supplementary legislation. A closely allied field of activity relates to the publication of the text of historical documents. This is one of the chief features of the work of the historical commissions or societies in most of the eastern states, and liberal appropriations are made for it. Already in this state many documents of unique value have been discovered in the possession of private individuals or in local depositories. When these exist only in the original manuscript, as is usually the case, they are not only practically inaccessible to the public, but are constantly in danger of being destroyed and so forever lost. In some cases of this kind the commission has had the documents transcribed with a view of having them published later in one of its reports. It is recommended, therefore, that the commission be authorized to take up the matter of the publication of such documents, and that a reasonable appropriation be made to cover the expense thereof.

Public Appreciation.

This report would not be complete without at least a brief recognition of the assistance rendered by the citizens, officials, and local newspapers of the state. Wherever the investigations of the commission have been carried on the reception given by the citizens and officials has been enthusiastic and loyal.

In an especial manner should the patriotic order of the Native Sons of the Golden West be commended for its service to the state both at the very beginning of this movement and later by adding to its efficiency through the activities of its local parlors. The newspapers of the state have also been heartily in support of the work both through news items and editorial commendation. Mr. Clarence M. Hunt, editor of the *Grizzly Bear*, has generously given space in the issues of that periodical for reports of the activities of the commission; while the great number of newspapers in the state, both daily and weekly, denominational as well as secular, have rendered most valuable assistance in bringing the work to the attention of the public. The value of all this to the work of the commission is twofold. In the first place the material assistance rendered is indispensable to its success, while the hearty support and words of appreciation confirm our belief that the work in hand is of much importance and that the final reports of the commission will be received by the public as contributions of great value.

PART II.

AN HISTORICAL ANALYSIS OF THE ARCHIVES OF THE COUNTY CLERK.

RECORDS OF THE COUNTY CLERK.

General Provisions.

The records under the custody of the county clerk constitute the most important collection in the archives of the counties, the only possible exception being the archives of the county recorder, which for land titles and similar matters are most valuable. To a person unfamiliar with the duties of the county clerk, or with the titles of the various records kept in his office, the great bulk and manifold kinds of records is apt at first to prove bewildering. In order to aid such a person to become somewhat acquainted with the duties of the office and with the contents of its archives the following analysis is here presented. This preliminary account is based almost entirely upon the provisions of the statutes or codes, which in many cases have been followed literally. In the later report, however, it is planned to publish a more thorough and critical analysis of the archives, based more largely upon the actual working conditions. It is hoped that to the person not yet familiar with the archives of the county clerk this may prove a helpful introduction, while to the overworked official this assembling of much scattered information, together with the frequent references to the statutes and codes, may also be of value as a convenient manual.

The records of the county clerk have been divided into three main divisions, corresponding to the classes of duties performed by that office. These divisions are as follows: I, Court records; II, Supervisors' records; and III, Miscellaneous records. Under the first division will be found a brief historical account of the various courts of which the county clerk has by law been made the clerk, together with a description of the various records kept by the courts. The second division includes all those records kept by the county clerk in his capacity as clerk of the board of supervisors. The third division is much less easily defined, but includes all other records kept by the county clerk, for many of his duties can not be considered as falling to him either as a clerk of the court or as clerk of the county board. In some cases these records might be capable of different classification, but since a rearrangement would lead to other complications it has been thought best to maintain their place in this miscellaneous group.

The earliest act prescribing the duties of the county clerk was passed by the first legislature April 18, 1850, and stated that they were to be as follows[1]: He was ex officio clerk of the district court, court of sessions and probate court of his county; he was empowered to administer oaths and to receive bonds; was required to attend each term of the county court and the other courts of the county; to keep an office at the county seat and "take charge of and safely keep or dispose of according to law all books, papers and records which may be filed or deposited in his office." A further section sets forth that he was to issue all writs, etc., enter all orders, judgments and decrees proper to be entered in the minutes; to keep a docket of each court in which he was to make certain specified entries; and was to keep such other books or records as might be prescribed by law or by the rules of the court.

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[1] Cal. Stats., 1850, 261–2.

A few unimportant amendments were made before 1872, when the duties of the clerk were outlined in the Political Code.[1] The first paragraph reiterated the provision regarding the safe-keeping of all records, books and papers filed or deposited in his office; the second declared that he was to act as the clerk of the board of supervisors, district, county and probate courts and attend each term of them and upon the judges in their chambers when required; third, that he was to issue all processes and notices required to be issued and to keep for each court a docket; fourth, he was to keep an index of all suits in the district and county courts. Among his duties were also included the keeping of such other records and duties as may be prescribed by law.

Since that time the changes made in the code have been of little importance.[2] In 1907 the code was rearranged and the sections cited replaced by sections 4178 and 4179, but these did little more than to incorporate the old provisions. Since 1872 the older courts had given way to the superior court with a consequent change in the title of the clerk's records.[3]

Court Records.

HISTORY AND ORGANIZATION OF THE COURTS.

District Court. At the time the state was first organized and for thirty years thereafter the judicial affairs of the counties were administered by three, and, for a part of the time, four separate courts. These were the district court, county court, probate court and the court of sessions. The highest of these was the district court. The state was divided into nine judicial districts. The district judges held court at the various county seats of their districts at certain specified dates. The jurisdiction of the court was original in all cases of law and equity and civil cases where the amount exceeded $200; and in all criminal cases not otherwise provided for; it covered all issue of facts in probate cases; and all cases of real property. The county clerk was ex officio clerk of the court.

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[1] Pol. Code (1872), §§ 4204–4205.

[2] Stats. and Amend. to Codes, 1880 : 102 ; 1883 : 323 ; 1891 : 322 ; 1893 : 374 ; 1897 : 482.

[3] Stats. and Amend. to Codes, 1907 : 404.

By the act of March 11, 1851, the number of districts was increased to eleven, the term of the judges fixed at six years, and the court given appellate jurisdiction over the county court, and the court of sessions in criminal matters.[1]

The number of districts varied, there being fifteen in 1855, reduced to fourteen in 1863. In the year 1863 the district court was given jurisdiction over cases involving the legality of any tax, impost, assessment, toll or municipal fine.[2]

In an act approved April 4, 1864, the matter of tax suits was much more fully considered. It provided that all actions for the collection of taxes on real estate wherein an order of sale was sought by the plaintiff should be heard in the district court of the proper county. For the keeping of the records regarding these suits the clerk of the court might be required to procure books as follows: an index book; a register of actions; an order book; and a decree book.[3]

This court also had jurisdiction in matters of naturalization, but since the records in reference to this are considered later under that head in the "Miscellaneous Records of the Clerk," no further mention will be made here. Under the constitution of 1879 the district court was discontinued, its jurisdiction within each county being given to the superior court of that county.[4]

County Court. By action of the first legislature a county court was established in each county, under the supervision of the county judge. Four regular sessions were to be held annually for the trial of appeals from the justices of the peace and such special cases as might be pending. The county judge was empowered to issue writs of habeas corpus and as conservator of the peace of the county could exercise all the powers of the justices of the peace as conservators of the peace. He was given jurisdiction over probate matters, and was required to hold a session of court for the hearing of such matters on the first Monday of each month. He was also given power to issue writs of injunction, mandamus, attachment and all other writs and processes known to the law. The county clerk was clerk of this court.[5]

In 1851 a general law was passed concerning the courts of justice of the state which repealed all previous laws on the subject. Under the new law the county court continued as before to have jurisdiction in lesser civil cases, except that its probate jurisdiction was given to a new probate court which was created, the county judge being, however, the judge of this new court. The appellate jurisdiction of the court included judgments rendered in civil cases in justice's or recorder's courts in the county, extended in 1853 to include also mayor's courts. In 1863 the court of sessions was abolished and its criminal jurisdiction given to the county courts.[6] Under the constitution of 1879 this court was discontinued, being superseded by the superior court.[7]

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[1] Cal. Stats. 1850: 93–96; 1851: 31–32.
[2] Cal. Stats. 1855: 117; 1863: 335.
[3] Cal. Stats. 1863–4: 399, 400.
[4] Cal. Stats. 1880: 21.
[5] Cal. Stats. 1850: 217.

Probate Court. The act of the legislature by which the county courts were created gave to those courts jurisdiction over probate matters, except that issues of fact joined in the probate court were to be tried in the district court. For the transaction of probate business the county judge was to hold a term of the court on the first Monday of every month.[8]

In 1851 a distinct court was created, to be known as the probate court, the county judge being made judge of this court. Its jurisdiction was similar to that formerly exercised by the county court over probate business.[9] Regarding issues of fact, it was required that in certain cases they should on request of either party be tried in the district court, but might by consent of parties be tried in the probate court. Appeals were also allowed to the district court from the decisions of the probate court.[10]

In 1864 an amendment to the law of 1851 allowed appeals to the supreme court from decisions of the probate court. In 1868 the sections regarding trial of issues of fact were amended so as to require these issues to be tried by a jury in the probate court instead of in the district court. As thus amended the provisions for the probate court were incorporated in the Code of Civil Procedure in 1872.[11] The probate court was discontinued in 1880, being superseded by the superior court, in accordance with the provisions of the constitution of 1879.[12]

Probate Records. There is great diversity in the methods of keeping the probate records, depending somewhat upon the size of the counties. This department, in common with the others, has a calendar, docket, index, file, register of actions and minutes. With the latter are included orders of the court. The larger offices have a great number of form books for entering orders, but all the volumes of minutes and orders are usually numbered consecutively in one series. In the probate department are also found volumes in which are recorded letters of administration and guardianship, in several different forms, guardians' inventories and appraisements, wills admitted to probate, and the records regarding the collateral inheritance tax.

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[6] Cal. Stats. 1851 : 17 ; 1853 : 293 ; 1863 : 336.

[7] Cal. Stats. 1880 : 21.

[8] Cal. Stats. 1850 : 217, 94.

[9] Cal. Stats. 1851 : 22.

[10] Cal. Stats. 1851 : 486 ; 1855 : 132, 300 ; 1861 : 630, 654.

[11] Cal. Stats. 1863–4 : 375 ; 1867–8 : 628 ; Code of Civ. Proc. (1872), §§ 94–100 ; 659-671 ; 1312 ; 1716.

[12] Cal. Stats. 1880: 21.

Court of Sessions. By act of the legislature in 1850 a court of record styled the court of sessions was organized in each county of the state, composed of the county judge and two justices of the peace, the county clerk being clerk of this court. Meetings were to be held every other month and their business was divided into two kinds known as criminal jurisdiction and county business. The criminal jurisdiction of the court of sessions extended to all cases of assault, assault and battery, breach of the peace, riot, affray, petit larceny and misdemeanors punishable by fine not over $500 or three months imprisonment. In addition to this criminal jurisdiction the court supplied the place later taken by the board of supervisors. The two kinds of business were radically different and the clerk was required to keep a separate set of minutes and records for each.[13] The records relating to county business are considered under the records of the board of supervisors.

An act of March 11, 1851, repealed the former law but embodied most of its features in the new act. Its jurisdiction here given was: (1) to inquire, by the intervention of a grand jury, of all public offenses committed or triable in the county; (2) to try and determine indictments found therein, for all public offenses except murder, manslaughter and arson; (3) to hear and determine appeals from the justice's, recorder's and mayor's courts in cases of a criminal nature.[14] In 1863 the court of sessions was discontinued and its criminal jurisdiction given to the county court.[15]

The Superior Court. In 1880 the present system of superior courts came into being in accordance with the terms of the constitution adopted the year preceding. These courts succeeded to the jurisdiction of the district courts, county courts and probate courts. There is in each county of the state a superior court, for each of which one or more judges are elected by the qualified electors of the county.[16] As now existing, the work of these courts is divided into three general classes for handling: (1) civil and criminal cases, (2) probate matters, and (3) the business of the juvenile court. For each of these divisions a separate set of records is kept.

The Juvenile Court. The Juvenile Court law, approved March 8, 1909, provided that the superior court should exercise the jurisdiction conferred by that act. In counties where there were more than one judge, one was to be selected to preside over this court. The sessions of the juvenile court must be held separate from other court sessions, and no persons permitted to be present except such as were connected with the business of the court. The orders and findings of the court were to be recorded in a "book to be kept for that purpose and known as the 'juvenile court record.'"[17] The juvenile court law of 1915 made no change in the provisions cited above except that it requires the orders and findings to be entered in a "suitable book or books or other form of written record, to be kept for that purpose, and known as the juvenile court record."[18]

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[13] Cal. Stats. 1850: 210.
[14] Cal. Stats. 1851: 18.
[15] Cal. Stats. 1863: 337, 346.
[16] Constitution, Art. VI; Code of Civ. Proc. (1915), §§ 65–79.

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[17] Cal. Stats. 1909: 213.
[18] Cal. Stats. 1915: 1225.

DESCRIPTION OF RECORDS.

Roll of Attorneys. An act of February 19, 1851, provided that admission of attorneys to general practice before all the courts of the state should be made by the judges of the supreme court, although the judges of the district and county courts might admit to practice in their respective courts. The clerk of each court was required to keep a roll of attorneys and counsellors at law admitted to practice before the court of which he was clerk, which roll the attorney was required to sign before he received his license, the roll being a record of the court. This arrangement continued in force until the adoption of the Code of Civil Procedure in 1872 when the provision regarding the district and county courts was omitted, being restored, however, by an amendment to the code in 1874. In 1880 the superior court took the place of the district and county courts. In 1895 the provision of the code permitting the superior court to admit attorneys to practice in that court was again removed, and in 1905 the examination and certification of attorneys was made the duty of the judges of the district courts of appeal. The clerks of these courts keep a roll of attorneys and transmit monthly to the clerk of the supreme court a list of those admitted during the month, and the clerk of the supreme court keeps a general roll of all attorneys admitted to practice in the state.[1]

Calendar. A book in which the clerk enters the cases before the court according to the date of issue. Under each date of the court session the clerk enters the titles of the cases to come before the court on that day, and after hearing, a notation showing what disposition was made of the case, whether dismissed, continued, etc., and if continued, to what date.[2]

Docket. A record book showing the title of each case, date of commencement, memorandum of each subsequent proceeding in such cause with the date thereof, and list of all fees charged in the cause. In the case of criminal action it must show each indictment according to date of filing; whether a felony or misdemeanor and whether the defendant be in custody or on bail.[3]

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[1] Cal. Stats. 1851: 48; C. C. P. (1872), §§ 276, 280; Code Amdts. 1873-4: 404; 1880: 55, 56; Cal. Stats. 1895: 56; 1905: 5, 6; C. C. P. (1915), §§ 276, 280.
[2] Cal. Stats. 1851: 75; Code Civ. Proc., § 593.

Execution Book. An amendment to the Practice act, approved April 2, 1866, provided that when an execution shall have been returned by the sheriff to the clerk, it shall be the duty of the latter to attach the same to the judgment roll. "If any real estate be levied upon, the clerk shall record the execution and the return thereto at large, and certify the same under his hand as true copies, in a book to be called the execution book, which book shall be indexed with the names of the plaintiffs and defendants in execution alphabetically arranged."[4]

Execution Docket. The act of April 22, 1850, provided (sec. 182) that the clerk shall keep an execution docket in which he shall enter an abstract of all executions issued by him, setting forth the names of the parties, character of the writ, amount, if it be for money, date of judgment with reference to page of record in which it is entered, date of execution, officer to whom issued, and return made upon the execution. This act was repealed the following year and the new act contained no mention of an execution docket, but the record was still kept in some counties, in one at least as late as 1901.[5]

File of Case Papers. The court file, more technically called the judgment roll, contains in civil cases the following papers: First, in case the complaint be not answered by the defendant, the summons and the affidavit or proof of service, and the complaint with a memorandum endorsed on the complaint that the default of the defendant in not answering was entered, together with a copy of the judgment; second, in all other cases the summons, pleadings, a copy of the judgment and any orders relating to a change of the parties.[6] In criminal cases the file contains, as demanded by the Criminal Practice act of 1851: (1) a copy of the minutes of any challenges which may have been interposed by the defendant to the panel of the grand jury, etc.; (2) the indictment and a copy of the minutes of the plea or demurrer; (3) minutes with reference to challenges of trial jurors; (4) copy of the minutes of the trial; (5) copy of the minutes of the judgment; (6) bill of exceptions, if there be one; (7) the written charges asked of the court, if there be any. The Penal Code in 1872 added (8) a copy of all charges given and of the endorsements thereon. This was amended in 1874 and continues in the present Penal Code which says the file shall contain: (1) the indictment or information and a copy of the minutes of the plea or demurrer; (2) a copy of the minutes of the trial; (3) the written instructions given, modified or refused, and the endorsements thereon and a certified transcript of the charge of the court; (4) a copy of the judgment.[7]

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[3] Cal. Stats. 1850: 262; 1851: 247; Pol. Code (1872), § 4204; (1915), § 4178.
[4] Cal. Stats. 1865–6: 703; Code Civ. Proc., § 683.
[5] Cal. Stats. 1850: 444; 1851: 153.
[6] Cal. Stats. 1881: 82; Code Civ. Proc., § 670.

General Index. The clerk is required to keep, in separate volumes, an index to all suits. One volume is headed "General Index—Plaintiffs" and has columns for entering the number of the suit, name of plaintiff, name of defendant, date of judgment, page of entry in the judgment book, page of minute book of the court. The other volume is headed "General Index—Defendants" and has a similar arrangement of columns. The only difference between the two volumes is that in the first the names of the plaintiffs are arranged alphabetically, while in the second the names of the defendants are so arranged.[8]

Insanity Commitments. In 1881 an amendment to section 2217 of the Political Code was adopted which requires that the county clerk shall keep a copy of the order committing an insane person to an insane asylum and shall prepare an index book showing the name, age and sex of each person ordered confined in a state hospital for the insane, together with the date of the order and the name of the hospital in which such person is ordered to be confined.[9]

Insanity—Certificates of Discharge. There was added to the Political Code in 1903 a provision that when any person is discharged, as recovered, from a state hospital for the insane, a copy of the certificate of discharge may be filed for record with the clerk of the superior court of the county from which said person was committed. The clerk shall record the same in a book kept for that purpose and shall keep an index thereto.[10]

Judgment Book. A book in which the clerk is required to enter a transcript in full of every judgment rendered by the court in a civil action. Criminal judgments are placed directly into the minutes.[11]

Judgment Docket. A book which the clerk is required to keep, having each page divided into columns headed as follows: Judgment debtors; Judgment creditors; Judgment; Time of entry; Where entered in judgment book; Appeals, when taken; Judgment of appellate court; Satisfaction of judgment, when entered. In 1907 an amendment required an additional column for the date of the entry in the docket.[12]

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[7] Cal. Stats. 1851: 263; Penal Code (1872), § 462; Code Amdts. 1873–4: 449; Penal Code (1915), § 1207.

[8] Cal. Stats. 1863: 260; Pol. Code (1872), § 4204; (1915), § 4178.

[9] Cal. Stats. 1881: 7; Pol Code (1915), § 2171.

[10] Cal. Stats. 1903: 509; Pol. Code (1915), § 2189.

[11] Cal. Stats. 1851: 82; Code Civ. Proc., § 668.

[12] Cal. Stats. 1851: 82, 83; 1907: 720; Code Civ. Proc. (1915), § 672.

Jury Lists. An act concerning jurors, approved April 28, 1851, provided that after the drawing of the lists of jurors, grand and trial, these lists should be filed in the office of the county clerk. Since that date there has been considerable variation in the method of preparing the jury lists, but the provision for filing in the office of the county clerk has been retained to the present day.[13]

Minutes. A record of the daily proceedings of the court, containing a synopsis of all orders, judgments and decrees proper to be entered, unless the court shall order them to be entered at length.[14]

Register of Actions. A book in which the clerk of the court is required to enter the title of each action, with brief notes under it, from time to time, of all papers filed and proceedings had thereon.[15]

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[13] Cal. Stats. 1851 : 291 ; 1852 : 108 ; 1859 : 184 ; 1863 : 631 ; 1863–4 : 525 ; 1881 : 70 ; 1895 : 298 ; Code Civ. Proc., § 208.

[14] Pol. Code (1915), § 4178.

[15] Cal. Stats. 1851 : 134 ; Code Civ. Proc., § 1052.

Supervisors' Records.

HISTORY AND POWERS.

Immediately after the organization of the state government the legislative functions of the counties were, by a law passed April 11, 1850, vested in the courts of sessions of the various counties.[1] The law provided that the court should hold separate sessions for the transaction of county business and it was required that the minutes and all other records of the court when so sitting should be kept separate and distinct from the records of the court when sitting as a court of criminal jurisdiction. The county clerk was made the clerk of the court of sessions and he was required to record in a book kept for the purpose the minutes of the court and regular entries of all resolutions, orders, decisions judgments and decrees touching county business. The powers granted to the courts of sessions were in general similar to those now vested in the boards of supervisors.[2]

An act of April 29, 1851, created for the county of San Francisco a board of supervisors and conferred upon them the powers in matters of county business formerly exercised by the court of sessions. And in the following year a similar law was passed applying to all the counties of the state except San Joaquin, Butte, Trinity, Santa Barbara, Nevada, Yuba, Solano, Mariposa, Sutter, Placer, Shasta, Siskiyou, Klamath, and Sierra.[3] This law was subsequently, at different times, repealed in so far as it related to the counties of Calaveras, Colusa, Contra Costa, Marin, Monterey, Sacramento, Santa Clara, Tulare, and El Dorado, and the powers and duties of the boards of supervisors in those counties handed back once more to the courts of session.[4]

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[1] For the composition, etc., of these courts, see page 25.

[2] Cal. Stats. 1850 : 210.

[3] Cal. Stats. 1851 : 322 ; 1852 : 87.

March 20, 1855, the law of 1852 was repealed and a new act passed which provided that "there shall be in each of the counties of this state a board of supervisors," and from this date the court of sessions finally ceased to have any legislative functions. There were from time to time special acts relating to the boards of supervisors in particular counties, but it will be unnecessary to notice these acts as they did not affect the general outlines of the original law of 1855. This law, variously amended and augmented, was embodied in the Political Code in 1872, in the various acts providing for a uniform county governmental system and is incorporated in the present Political Code.[5]

The powers and jurisdiction of the board of supervisors, as stated in the law of 1855, were as follows:

> 1. To make orders respecting and to take care of and preserve the property of the county;
> 2. To examine, settle and allow all accounts against the county and levy the necessary and lawful taxes;
> 3. To examine and audit the accounts of all officers having to do with county money;
> 4. To lay out, control and manage roads, ferries, bridges, etc.;
> 5. To take care of and provide for the indigent sick of the county;
> 6. To divide the county into townships and to change these as convenience may require;
> 7. To establish and change election precincts and appoint inspectors and judges of elections;
> 8. To control and manage the property of the county and to receive, by donation, any property for the use and benefit of the county;
> 9. To lease or purchase any real or personal property necessary for the county, after a proper valuation by three disinterested persons;
> 10. To sell at public auction, after thirty days notice, any property of the county;
> 11. To cause to be erected, furnished and kept in repair a court house, jail or other public buildings, after receiving bids duly advertised;
> 12. To control the prosecution and defense of all suits to which the county is a party;
> 13. To do and perform all such other acts and things as may be strictly necessary to the full discharge of the powers and jurisdiction conferred on the board.

The board shall also act as a board of equalization, shall cause the state and county taxes to be levied, shall publish a semiannual statement of the revenues of the county, and they may, by an order entered on the record, adopt, ratify and confirm all the acts, proceedings and contracts of the court of sessions heretofore made.[6]

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[4] Cal. Stats. 1853: 153, 227; 1854: 32, 40, 44, 52, 222.

[5] Cal. Stats. 1855: 51 *et seq.*; Pol. Code (1872), § 4022–4087; Cal. Stats. 1883: 299 *et seq.*; 1891: 295 *et seq.*; 1893: 346 *et seq.*; 1897: 452 *et seq.*; Pol. Code (1915), § 4027–4090.

Subsequent legislation has greatly expanded this statement of the powers and jurisdiction of the board of supervisors, but most of these later additions may properly be construed as being included or implied in the enumeration above. It may, however, be well to note some of these additional powers as they are given in the Political Code of 1915.

> 14. To maintain public pounds and to fix the limits within which animals shall not run at large;
>
> 19. To fill vacancies in county and township offices, with certain exceptions;
>
> 26. To destroy pests, such as gophers, squirrels, noxious weeds and insects injurious to fruits or vegetable or animal life;
>
> 27, 28. To protect sheep, fish and game;
>
> 29. To provide for working of prisoners on public roads, buildings, etc.;
>
> 31. To make local police, sanitary and other regulations;
>
> 33. To levy a tax for advertising the resources and advantages of the county;
>
> 39. To encourage tree planting;
>
> 40. To protect river banks.[7]
>
> 41. To replace indexes of county records destroyed by fire or other public calamity.[8]
>
> 42. To preserve the health of domestic live stock.[9]
>
> 43. To take a census, in years other than those in which the federal census is taken, of the county or of any township or district therein.[10]

DESCRIPTION OF THE RECORDS.

The earlier laws contained only general provisions that the board of supervisors (or court of sessions) should cause to be kept a book in which should be entered fully the minutes of the board and all their resolutions, orders, decisions, judgments and decrees.[11] The Political Code, adopted in 1872, in defining the duties of the clerk of the board, provided that he must: (1) Record all the proceedings of the board; (2) Make full entries of all their resolutions and decisions on all questions concerning the raising of money for and the allowance of accounts against the county; (3) Record the vote of each member on a division or at the request of any member; (4) Sign all orders made and warrants issued by order of the board for payment of money and certify the same to the county auditor; (5) Record the reports of the county treasurer of the receipts and disbursements of the county; (6) Preserve and file all accounts acted upon by the board; (7) Preserve and file all petitions and applications for franchises and record the action of the board thereon; (8) Record all orders levying taxes; (9) Perform all other duties required by law or by any rule or order of the board.[12] To which were added in 1883 the following: (10) Authenticate with his signature and the seal of the board the proceedings of the board whenever the same shall be ordered published; (11) Authenticate, etc., all ordinances passed by the board, and to record the same at length in the ordinance book.[13]

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[6] Cal. Stats. 1855: 51 et seq.

[7] Pol. Code (1915), § 4041 *passim*.

[8] Pol. Code (1915), § 4043*a*.

[9] Pol. Code (1915), § 4056*a*.

[10] Pol. Code (1915), § 4055.

[11] Cal. Stats. 1850: 210; 1852: 87; 1855: 51.

The Political Code in 1872 provided that the board must cause to be kept: (1) A "Minute Book," in which must be recorded all orders and decisions made by them, and the daily proceedings had at all regular and special meetings; (2) An "Allowance Book," in which must be recorded all orders for the allowance of money from the county treasury, to whom made, on what account, date, number and index; (3) A "Road Book," containing all proceedings and adjudications relating to roads, road districts, and overseers thereof, their reports and accounts; (4) A "Franchise Book," containing all franchises granted by them, for what purpose, length of time and to whom granted, the amount of bond and license tax required; (5) A "Warrant Book," to be kept by the county auditor, in which must be entered all warrants drawn on the treasury, with their number and reference to the order in the minute book, with the date, amount, on what account, and name of payee.[14] To these was added in 1883 the following: (6) An "Ordinance Book," in which must be entered all ordinances duly passed by the board.[15]

Road Records. The Political Code at the time of its adoption in 1872 prescribed that the clerk of the board must keep a book in which must be recorded all proceedings of the board relating to each road district, including orders laying out, altering, and opening roads. In a separate book he was required to keep a description of each road district, its overseers, roads, highways, contracts, and other matters pertaining thereto.[16] By an amendment adopted in 1883 all of the data required to be placed in the first book just mentioned was to be incorporated in the minutes of the board in addition to which the clerk was also to keep a road register in which must be entered the number and name of each public highway in the county, a general reference to its terminal points and course, also the date of the filing of the petitions or other papers, a memorandum of every subsequent proceeding in reference to it, with the date thereof, and the folio, and the volume of the minute book where it is recorded.[17]

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[12] Pol. Code (1872), § 4030.

[13] Cal. Stats. 1883: 302; Pol. Code (1915), § 4038.

[14] Pol. Code (1872), § 4031.

[15] Cal. Stats. 1883: 302; Pol. Code (1915), § 4039.

[16] Pol. Code (1872), § 2621.

Equalization. The Political Code (1872) required that the records of the board of supervisors when acting as a board of equalization be kept separate from the other records of the board, section 3682 reading, in part: "The clerk of the board must record in a book to be kept for that purpose all changes, corrections, and orders made by the board relative to equalization of assessments." This requirement has remained in the code since that date.[18] Under this provision therefore are to be found minutes of the board of equalization, petitions and actions regarding erroneous assessments, etc.

Burial of ex-Union Soldiers, Sailors and Marines. A law enacted in 1889 requires that the board of supervisors provide for the proper burial of ex-Union soldiers, sailors and marines, who die in the county without sufficient means, the burial to be in charge of some proper person and to be at a cost not to exceed fifty dollars. The person in charge of the burial is required to make a report on the condition and history of the man and his family, this report with the other facts in the case to be entered by the clerk in a book to be kept for that purpose.[19]

Maps of Voting Precincts. Section 1125 of the Political Code, added in 1915, provides that in all counties (with certain exceptions) the county surveyor shall, upon the written request of the county clerk or registrar of voters, divide the county into election precincts and prepare detail precinct maps and exterior descriptions and copies thereof, which shall be filed with the board of supervisors and adopted by them.[20]

Miscellaneous Records.

In addition to those duties which the county clerk has, by virtue of his being clerk of the courts or clerk of the board of supervisors, there are many other miscellaneous records kept by him. These may in some cases appear to be closely related to one of the other groups, but after careful consideration have been classed among these miscellaneous records. For convenience they have been arranged into a number of subdivisions as follows: (1) Office routine and general duties; (2) Marriage and public health; (3) Naturalization; (4) Registration; (5) Elections; (6) Records relating to private business; (7) Records relating to other officers.

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[17] Cal. Stats. 1883: 7; Pol. Code (1915), § 2622.

[18] Pol. Code, § 3682.

[19] Cal. Stats. 1889: 198.

[20] Cal. Stats. 1915: 861.

OFFICE ROUTINE AND GENERAL DUTIES.

Under this heading are grouped such records as the clerk's cash book, memorandum of accounts, fee book, special deposit record, etc. With the exception of the fee book, which is kept in some form by all clerks, there is but little uniformity in the titles or form of these records, although they are in general similar in nature. In addition to these financial records there are also others relating to correspondence, a file of miscellaneous papers and the clerk's land register docket, under the Torrens Land act. Other titles which deserve more extended treatment are considered in the following paragraphs.

Hunting and Fishing Licenses. The game law enacted March 13, 1907, required the county clerk to enter in a book kept for that purpose the name and resident address of every person to whom is issued a hunting license, and a description of such person, by age, height, race and color of eyes and hair. The 1909 law repeated this requirement and it is still in force. By an act of June 16, 1913, a similar provision is made regarding "Sporting fishing licenses." Other documents relating to game licenses, such as applications for licenses and license stubs, are also frequently kept by the clerks. They are, however, considered as merely temporary records and are usually soon destroyed.[1]

Military Rolls and Military Tax. An act concerning the organization of the militia, approved April 10, 1850, provided that "all free, white, able-bodied citizens, between the ages of eighteen and forty-five years, residing in this state and not exempt by law, shall be subject to military duty." All who were not exempted by law, and not members of any volunteer or independent company, were required to pay to the county treasurer two dollars a year as a commutation for the nonperformance of military duty. Provision was made for enforcing the collection of this military tax. This law also required the assessor each year to make out a separate and distinct list of all persons subject to military duty and not exempt by law and not members of any volunteer or independent company. A certified copy of this list was to be sent to the Adjutant General of the state and the original list deposited in the office of the county clerk.[2]

An act approved April 25, 1855, reenacted the earlier section regarding those subject to military duty. It also required the assessor, as before, to make out a military list, a copy to be transmitted to the Brigadier General of the brigade to which his county belonged, and the original to be deposited in the office of the county clerk. This law required the payment of a tax of twenty-five cents by each person on the military list for the support of the volunteer militia of the state. The assessor was to assess this tax and it was to be collected and returned in the same manner as other taxes.[3] An amendatory act of April 10, 1856, increased the military tax to fifty cents and required the state controller to have uniform blank receipts printed and distributed to the various counties for use in the collection of this tax.[4]

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[1] Cal. Stats. 1907 : 247 ; 1909 : 663 ; 1913 : 986 ; Deering, Gen. Laws (1915) : 486, 489.

[2] Cal. Stats. 1850 : 190.

An act approved May 9, 1861, repealed the previous laws regarding the militia but reenacted the section regarding those subject to military duty. This law also required the assessor, as before, to make out the military list of the county, which list was to be delivered to the clerk of the board of supervisors. These provisions were repeated in the militia act of the following year.[5] An amendatory and supplemental act passed in 1863 levied upon each male inhabitant of the state of the age of twenty-one years an annual tax of two dollars, to be known as the "military poll tax," to be assessed and collected in the same manner as the state poll tax. Volunteers in the United States army were exempted.[6] The laws of 1855, 1861, and 1862 also required the muster roll of each company to be filed with the county clerk of the county in which it was located.

By the adoption of the Political Code in 1872 the previous laws regarding the militia were repealed or superseded. Sections 1895 to 2117 of the code as then adopted had to do with the state militia. Section 1897 required the assessor each year to make out a military roll for the county, as under the earlier laws, and to deliver the same to the clerk of the board of supervisors. The board of equalization must then correct the military roll at the same time as the assessment roll, and the clerk must send a copy of the corrected list to the Brigadier General of the brigade to which his county belonged.[7] In 1897 this was amended by requiring two copies of the roll to be delivered to the clerk of the board of supervisors, and in 1913 by requiring the military roll to be made up only in each odd-numbered year, and by substituting "Adjutant General of the state" for "Brigadier General of the brigade."[8]

MARRIAGE AND PUBLIC HEALTH.

Marriage Licenses. The Civil Code (March 21, 1872) first set down the requirement of a marriage license preceding the performance of the marriage ceremony, section 69 of which provided that the parties wishing to be married must first obtain a license from the clerk of the county court showing: (1) the identity of the parties; (2) the real and full names and place of residence; (3) that they are of sufficient age to be able to consent to marriage; (4) that if the male is under twenty-one or the female under eighteen, that the consent of the parent is given or that the party had been married before.

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[3] Cal. Stats. 1855 : 136.
[4] Cal. Stats. 1856 : 87.
[5] Cal. Stats. 1861 : 321 ; 1862 : 362.
[6] Cal. Stats. 1863 : 446.
[7] Pol. Code (1872), §§ 1897, 1899, 1900.
[8] Cal. Stats. 1897 : 406 ; 1913 : 710, 711.

Two unimportant amendments were made in this section of the code[9] before 1905, when it was more thoroughly revised.[10] This amendment required that the applicant must show upon oath the facts demanded in the earlier section. It further forbade marriages between certain races, or the marriage of imbeciles, insane persons or persons under the influence of intoxicants.[11]

Record of Medical Certificates. The first of a series of acts regarding the registration of persons engaged in professions having to do with the public health of the people of the state was enacted April 3, 1876, and created a state board of examiners who were to grant medical certificates to such persons as were by them considered qualified to practice medicine. These were to be recorded in the office of the county clerk in the county in which the physician had his practice; and for this purpose the clerk was to keep a book, which would contain a complete list of the certificates recorded by him.[12] In 1901 this act was replaced by a new law forming the board of medical examiners but in sections eight and nine it prescribes similar duties to the county clerk as those previously required.[13]

Register of Dentists. On March 12, 1885, the first act requiring the registration of dentists was passed. A board of examiners was created to pass upon the qualifications of applicants and it was made unlawful for dentists who were not already practicing to begin practice without first obtaining a license. Practicing dentists were required to file their names for registration with the county clerk within a period of six months, and all new applicants were to register before beginning their practice. For this purpose the county clerk was required to keep a book to be known as the ''Register of Dentists.'' An amendment was made to the act in 1893, but in no wise affected the manner of the clerk's record and in 1901 the act of 1885 was replaced by another without materially affecting the issue considered.[14]

On March 20, 1903, further changes were made and in addition to the requirement of registering the license it was also required that the applicant give his name, age, office address and number of his license;

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[9] Cal. Stats. 1873–74 : 186 ; 1880 : 3.

[10] *Ibid*, 1905 : 182.

[11] Civil Code (1915), § 68–69.

[12] Cal. Stats. 1875–76 : 792.

[13] Cal. Stats. 1901 : 56–64.

[14] Cal. Stats. 1885:110; 1893:70; 1901:564.

and in addition file an affidavit that he is the party mentioned in the license. The affidavits were also to be placed on file in a bound volume.[15]

Register of Osteopaths. On March 9, 1901, the State Board of Osteopathic Examiners was created with power to pass upon the qualifications of persons applying for osteopathic licenses. These licenses were to be recorded with the county clerk in similar manner to other medical licenses in a book known as the "Register of Osteopaths."[16] On March 14, 1907, the State Board of Medical Examiners was reorganized to include members of the Osteopathic Association and to them was given the power to grant licenses to osteopaths. The clerk was required to keep a record of all certificates filed with him. These are kept in the same volume known above as the "Register of Osteopaths."[17]

Register of Optometrists. On March 20, 1903, the California State Board of Examiners in Optometry was created. Certificates were to be granted by them to persons qualified to practice optometry. These were to be presented to the county clerk for record and placed in a record book provided especially for that purpose.[18]

Register of Pharmacists. The State Board of Pharmacy was created in 1891 but the law required no records of licenses to be kept other than those of the board itself.[19] Further changes in the act were made in 1893, and it was replaced by a new act in 1901 but none of these acts required the keeping of local records.[20] On the 20th of March, 1905, another act was passed covering the matter and this time it was provided that the county clerk keep a record of certificates granted by the state board, and notify that board that the certificate had been recorded, giving name and date of filing.[21]

NATURALIZATION.

The federal naturalization laws give jurisdiction over naturalization matters to state courts of record having a seal, a clerk and jurisdiction in actions in which the amount in controversy is unlimited. This includes the superior and higher courts.

The first naturalization law, passed March 26, 1790, provided a very simple procedure. Citizenship might be conferred by any common law court of record upon a hearing in which it should be shown that the applicant had been at least two years a resident in the United States, and upon his taking the required oath of allegiance, etc. No previous declaration of intention was necessary, but the clerk was required to record the application and proceedings thereon in the records of the court. No special record book seems to have been called for.[22]

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[15] Cal. Stats. 1903 : 322.
[16] Cal. Stats. 1901 : 113.
[17] Cal. Stats. 1907 : 252.
[18] Cal. Stats. 1903, 285 ; 1907 : 63, modifies the act but not this part.
[19] Cal. Stats. 1891 : 86.
[20] Cal. Stats. 1893 : 68 ; 1901 : 299.
[21] Cal. Stats. 1905 : 539 ; another act without material change, 1907 : 766.

The next law, passed January 29, 1795, made necessary the filing of a declaration of intention three years before the final application for admission, and also increased the residence requirement to five years. The same provisions were included for recording the proceedings as in the previous law.[23] From that time until 1906 the plan of naturalization remained much the same, though there were variations in detail and some special enactments at different times. So far as the records were concerned there were no material changes. While there was no specific requirement in the statutes for special record books, an examination of the records of the various courts shows that special books were, in actual practice, kept for the recording of declarations of intention, petitions and certificates, and for naturalization indexes of various kinds.[24]

A California state law passed in 1872 requires the clerk of the court to provide two books, in one of which he shall enter in alphabetical order the names of all persons who, from the organization of the court, have declared their intention to become citizens of the United States, together with the date of the declaration. In the other book he is required to enter in alphabetical order the names of all persons by that court admitted to citizenship in the United States, together with the name of the country of which each was before a citizen or subject; the date of admission and the page of the court record book containing the order admitting him.[25]

The present naturalization law, approved June 29, 1906, requires: (1) A declaration of intention, to be filed at least two years prior to admission; (2) A petition for naturalization, to be filed not less than two nor more than seven years after the declaration of intention, with this must also be filed a certificate of arrival, for all aliens coming to this country after June 29, 1906; (3) An examination of the alien by the clerk at the time the petition is presented and a final hearing, after notice, at which time the petition is either granted or rejected.

The blank forms for the declaration of intention, petition for naturalization and certificate of naturalization are furnished by the bureau at Washington. The permanent court records required by the law of 1906 are as follows: (1) The original declarations of intention, bound in volumes and numbered consecutively from volume to volume, beginning with number one in volume one; (2) The petitions for naturalization bound and numbered in similar fashion, together with a record of final orders upon the petitions for naturalization, which in the forms provided by the bureau is kept upon the back of the petition; (3) The stubs of the certificates of naturalization.[26]

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[22] U. S. Stats. 1: 103.

[23] U. S. Stats. 1: 414.

[24] Fed. Stats. Annotated (see index); Rev. Stats., §§ 2165–2174.

[25] Cal. Stats. 1871–2: 80; Gen. Laws, 1915 (Deering), 1204.

REGISTRATION.

Before the year 1866 no restrictions were placed upon prospective voters as is now done by the registration laws. This resulted in much confusion and frequent charges of corrupt practice whenever the elections were closely contested. The "Registry Act," so-called because it required the registration of all prospective voters, was approved March 19, 1866. By its terms the county clerk was required to provide suitable books to be known as the "Great Register" in which were to be recorded the names of all domiciled inhabitants of the county who were qualified electors and legal voters thereof.

The form of the record and the manner of registration were set forth in the law and provided that clear and distinct entries should be made setting forth in separate columns the name of the person in full; his age, the country of his nativity; his occupation and exact residence; and if a naturalized citizen, further data regarding his naturalization were required. These statements were then to be sworn to by the person registered and that fact stated in the record. A further column was provided for the record of the cancellation of the entry, the cause of the cancellation being stated by either of the words "dead," "removed," "insane" or "infamous." To assist the county clerk in the registration of the voters the county assessor was required to enroll and return to the clerk the names of all unregistered persons entitled to registration. He was authorized to administer the oath in the same manner as the clerk, and for his work received a stated remuneration.[27]

An amendment to the "Registry Act," which did not materially affect the manner of keeping of the records, was adopted in 1868,[28] but otherwise the original provisions were incorporated in the Political Code when it was adopted in 1872. At this time it was further provided that before the 5th of August, 1873, and every second year thereafter, each county clerk was to make out a copy of the uncancelled entries existing on the great register on the preceding first day of August. These names were to be arranged alphabetically according to surnames and numbered consecutively. These lists were then to be printed and copies distributed to each of the election precincts within the county and to certain other depositories and libraries or electors applying for them. The clerk was also required to file and preserve all affidavits returned to him by the assessor or used before him for the purpose of obtaining registration.[29]

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[26] U. S. Stats. at Large, 34: 596 *et seq.*

[27] Cal. Stats. 1865–66: 288–301; 1899: 63.

[28] Cal. Stats. 1867–68; 647.

By a statute of 1878 it was provided that all qualified voters should register anew in the counties of Fresno, Kern, Tulare, Stanislaus, Merced, Amador, Butte, Nevada and Siskiyou,[30] and other amendments provided that in other counties the board of supervisors should have the power to require the new registration of voters whenever in their opinion the conditions demanded it.[31]

In 1895 a more thorough change was made in the registration laws. The data required upon the affidavit made by the applicant was now extended to include the full name of the registered person; his business or occupation; his age, height, complexion, color of eyes and hair; place of residence (ward and precinct); time and place of naturalization, if naturalized; the date of entry; post office address; and whether or not the applicant was able to read the constitution in the English language, to write his own name; and whether or not he was prevented by any physical disability from marking his ballot.[32]

The clerk was now required to arrange the registration affidavits in precinct packages. At the end of the period of registration all these affidavits for the county were to be arranged alphabetically and the substance of them entered into separate precinct books.[33] From the data incorporated in these books printed copies of the great register were to be prepared either for the county as a whole or by precincts. In counties where it was not required that a new registration take place, supplemental registers were to be printed. These printed copies were then to be distributed among the officers, election boards, libraries, etc.[34]

Further amendments to the code in 1899 required that in all the counties of the state a new registration should be made on each even numbered year. At this time a few changes were also made in the data required on the registration affidavit: complexion, and color of eyes and hair were omitted; while on the other hand, the state in which one was born was now required as well as country of nativity.[35]

Within fifteen days after the close of the registration the affidavits were to be arranged for each precinct alphabetically, in order of surnames. These, both originals and duplicates, were then to be bound into books and a printed index prepared for each book, the index to show names, ages, addresses and numbers of the voters as they appear in the precinct books.[36] In 1903, section 1103 was further amended requiring that all affidavits of registration be preserved for at least five years from the date thereof, but that after the affidavits and duplicates had been preserved for that period they might, upon the order of the board of supervisors, be destroyed.[37]

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[29] Pol. Code (1872), §§ 1094–1115.

[30] Cal. Stats. 1877–78 : 693–94.

[31] Amend. Codes, 1877–78 : 26–27 ; 1889 : 424.

[32] Cal. Stats. 1895 : 228 ; Pol. Code, § 1096.

[33] Cal. Stats. 1895 : 230 ; Pol. Code, § 1113.

[34] Cal. Stats. 1895 : 231–2 ; Pol. Code, § 1115.

[35] Cal. Stats. 1899 : 60–61 ; Pol. Code, §§ 1094, 1096.

The keeping of the great register was discontinued by an amendment to the code approved April 19, 1909, which specifies that these affidavits shall constitute the register required to be kept for the registration of voters, and that the person charged with the registration of voters shall not copy the facts shown by the affidavits as a part of his duties.[38] These affidavits must be preserved for five years, but after that time may be destroyed. An index to the registration affidavits, giving numbers, names, ages, occupations and addresses, was to be prepared within five days after the close of registration, and this was to be printed to the number of at least one hundred copies; a general index of all the precincts arranged alphabetically by precincts should then be made, one copy of which must be kept in the clerk's office for public reference.[39]

The adoption of woman's suffrage caused further changes to be made in the form of the registration affidavit. The amendment to the Political Code approved January 9, 1912, provides that the affidavit must show: the full name of the person; sex; occupation; height; country or state of nativity; exact place of residence; political affiliation, if any; place of naturalization, if naturalized; date and place of marriage and name of person to whom married, if citizenship was thereby acquired; the date of registration; post office address; and ability to read the constitution, etc., as in the earlier affidavits.[40]

The registration law as it now stands (1916) is not materially different from the early acts and amendments of which it is the natural outgrowth. It provides for the complete registration of voters in each even numbered year. The registration affidavits must be made in duplicate. The data required upon them, while not so full as under the earlier acts, is somewhat more explicit and requires that the affiant sign the affidavit with his or her accustomed signature. These affidavits themselves form the great register, the originals being arranged alphabetically by precincts and bound in this order, while the duplicates are filed in a strictly alphabetical manner without any regard to precincts. Indexes to the precinct books are prepared and printed, containing the numbers, names, occupations and addresses of the electors as they appear in the registration books. A general index of these books, arranged alphabetically by precincts, shall be bound and at least one copy kept in the office of the county clerk for public reference.[41]

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[36] Cal. Stats. 1899: 62; Pol. Code, §§ 1103, 1113–1116.
[37] Cal. Stats. 1903: 257.
[38] Cal. Stats. 1909: 1004; Pol. Code, § 1103.
[39] Pol. Code, § 1115.
[40] Cal. Stats. 1911 (extra session): 196.

Poll Lists, while not, strictly speaking, registration records, should be noted in this connection, as they constituted the only official record of voters between 1850 and 1866 and were kept as a sort of supplemental registration between 1866 and 1872. The act to regulate elections, approved March 23, 1850, required the county judge to furnish to each inspector of elections for each election two copies of a blank form containing one column headed "Names of voters" and one column headed "Numbers of votes," with proper captions and certificates. At the time of holding the election the name of each person voting was to be entered on these blanks together with the number. These poll lists were to be included with the election returns, one copy of which was to be preserved by the inspector for at least six months, and the other sent to the county clerk.[42]

The Registry act of 1866, elsewhere noted, did away with these earlier poll lists and provided for the preparation of poll lists before each election by a board of registration for each precinct. This board was to consist of one clerk and two judges to be elected or appointed to serve for a period of two years. The poll list was to be prepared during the ninety days preceding the election, and was to be completed on the thirtieth day preceding the election, after which it was to be sent to the county clerk who had it printed, together with the other poll lists for the county. Copies of the printed lists were then sent to each clerk of election, and a final revision was made by the board of registration in the three days preceding the election. The poll list was to be made up from the uncancelled names on preceding poll lists, from the great register and from the oral applications of those entitled to be enrolled as electors for the election. The list was to contain columns for the number, name, date, age, class (whether native or naturalized), occupation and address of each person enrolled, and a column in which the fact of his having voted or his vote having been rejected should be noted at the time of the election. These lists, constituting a record of those who voted, were also to be included with the election returns, as in the case of the earlier poll lists. Prior to July 1, 1867, registration in the great register was not a necessary prerequisite to enrollment on the poll list; after that date it was, except in the case of persons naturalized, becoming of age or coming into the county within thirty-five days preceding the election.[43]

The Political Code in 1872 abolished these poll lists. In a note the Code Commissioners say: "We have abolished the poll list, * * *

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[41] Pol. Code (1915), § 1094 *et seq.*
[42] Cal. Stats. 1850: 101 *et seq.*
[43] Cal. Stats. 1866: 288 *et seq.*

have made provision by which the great register will perform all the offices the poll lists were ever intended to perform. Experience has shown that the poll lists are prolific sources of fraud.''[44]

ELECTIONS.

Election Returns. The act to regulate elections, approved March 23, 1850, provided that the election returns, consisting of the poll list and tallies, with a certificate attached thereto stating the number of votes each person received and the office to fill which such votes were cast, signed by the election officials, should be made up in duplicate, one set to be retained by the inspector and preserved for at least six months, the other set to be endorsed ''Election Returns'' and sent to the county clerk. The ballots were to be destroyed. The clerk was required, from the returns of the various precincts, to ''estimate'' the vote of the county and draw up and sign a statement of the same, containing the names of the offices voted for, the number of votes polled at each precinct by each candidate for the office, and the totals for the county, which statement was to be filed, together with the returns from each precinct, in the office of the court of sessions.[45] In 1855 the last phrase was amended to read ''in the office of the county clerk.''[46] In 1861 an important amendment was adopted providing that the returns should be canvassed by the board of supervisors and the detailed statement of the result entered by the clerk upon the records of the board.[47]

In 1863 the law was further amended by a requirement that the ballots, instead of being destroyed, should be strung on a thread or cord and enclosed with the returns sent to the county clerk. This enabled the board of supervisors to recount the ballots in case any elector so demanded. The ballots were to be kept by the clerk at least six months.[48] In the following year a record of challenges and oaths administered was required to be kept by the election officials and included with the election returns, but this law was repealed two years later.[49] In 1866 an amendment required the election board to keep, separate from the poll list, a list of voters, containing the names of all who voted, numbered consecutively on the left and with the poll list number placed to the right of each name. This list was to be included with the returns sent to the county clerk.[50]

In 1872 the election laws, with some amendments, were incorporated in the Political Code adopted that year. These changes were as follows: The ballots were to be sealed up in an envelope separate from the other returns, but otherwise sent in as before, and to be kept, unopened, by the county clerk for twelve months and then, if not required by court actions, to be destroyed. The returns sent to the county clerk, under seal in charge of a member of the election board selected by lot, were to include the copy of the great register (which had now taken the place of the poll list) upon which the names of those voting had been marked, all certificates of registration received by the election board, the list of persons challenged, one copy of the list of voters and one copy of the tally list and list attached thereto. As soon as the returns were canvassed the clerk was required to take the copy of the register returned and file it in his office.[51]

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[44] Pol. Code (1872), § 1095 (note).
[45] Cal. Stats. 1850 : 101 ff.
[46] Cal. Stats. 1855 : 161.
[47] Cal. Stats. 1861 : 529.
[48] Cal. Stats. 1863 : 354.
[49] Cal. Stats. 1863–4 : 468 ; 1865–6 : 512.
[50] Cal. Stats. 1865–6 : 511.

These provisions have remained in the code and are the present law with reference to election returns, except as herein noted. In 1899 and 1901 amendments were adopted which require that the election board must post outside of the polling place a copy of the result of the votes cast, and transmit one copy of the same, unsealed, to the county clerk, to be kept open to public inspection.[52] In 1899 a provision was inserted that any person desiring to vote shall write his name and address (or if unable to do so, have it written for him) on a roster of voters provided for that purpose, and in 1905 a new section was added to the code which requires that the roster of voters shall be sealed up by the election board and sent, in the same manner as the other returns, to the county clerk, who shall open all the rosters of voters and keep them open for public inspection for one year.[53] In 1913 it was provided that the list of voters, tally list, etc., theretofore required to be retained by the inspector, shall be sent to the county clerk and by him kept open for public inspection for at least six months.[54]

Certificates of Nomination and Nomination Papers. These are temporary records and it is sufficient to consider them very briefly. Beginning with 1891 it is required that certificates of nomination made by conventions and nomination papers, including those filed for the purpose of getting the name of a candidate on either the primary or general election ballot, shall be filed, in the case of county offices, with the county clerk, who shall preserve them for two years and then destroy them.[55]

Verification Deputies. Under the Primary law, since 1909, signatures to nomination papers have been secured by what are known as "Verification Deputies." These are persons appointed by the candidate or the proponents of a candidate under the provisions of the law.

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[51] Pol. Code (1872), §§ 1259–1282.
[52] Cal. Stats. 1899: 83; 1901: 5.
[53] Cal. Stats. 1899: 62; 1905: 633; Pol. Code (1915) §§ 1204, 1264*a*.
[54] Cal. Stats. 1913: 226.
[55] Cal. Stats. 1891: 165 ff; 1909: 691 ff; 1911: 769 ff; 1913: 1379 ff; 1915: 845.

The document by which such verification deputies are appointed shall be filed with the county clerk.[56]

Record of Nominations. The Primary Election law of 1911 contains a provision that the officer with whom nomination papers are filed shall keep a record in which he shall enter the names of all persons filing the same, the party, if any, and the time of filing. An amendment approved January 11, 1916, says that he shall enter the names of every person presenting nomination papers for filing, the name of the candidate, the title of the office, the party, if any, and the time of filing.[57]

Record of Delegates Elected to Conventions. In the general primary law of 1897 a section is included providing that the clerk must, in a proper book, record the names of all delegates elected to conventions, with certain data in reference thereto. In 1899 this provision was incorporated in the Political Code, but in 1901 was repealed.[58]

RECORDS RELATING TO PRIVATE BUSINESS.

Articles of Incorporation. All the laws regarding corporations have required the filing of the articles of incorporation, but before 1872 there was no uniformity as to the place where they should be filed.[59] In most cases they were to be filed in the office of the county clerk, but in some cases it was frequently required that a certified copy should also be filed in the office of the secretary of state; while in other cases the original articles were to be filed in the office of the secretary of state.[60] In a few cases the articles were to be filed in the office of the county recorder.[61]

In 1872 the corporation laws were codified in the Civil Code. It was provided that all articles of incorporation shall be filed in the office of the county clerk of the county where the business of the corporation is to be transacted and a copy filed in the office of the secretary of state.[62]

Rural Cemetery Associations. In 1859 a law was passed providing for the organization of such associations. The officers were required to file with the county clerk a certificate (similar to articles of incorporation), which certificate the clerk shall record "in a book appropriated to the recording of articles of incorporation."[63]

Bond and Surety Companies. In 1907 an amendment to the Political Code required the county clerk to keep as one of his records a volume to be labeled "Bond and Surety Companies," the pages of which must be divided into columns for entering the name of the corporation, name of state, territory or country under whose laws it is organized, date of the certificate to do business in this state, date of surrender, revocation, etc., of such certificate, date of new authority to do business.[64]

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[56] Primary law, 1909, 1911, 1913, Sec. 5.

[57] Cal. Stats. 1911: 776; 1916 (extra session): 8.

[58] Cal. Stats. 1897: 115; 1899: 47; 1901: 606.

[59] Cal. Stats. 1850: 351, 365, 369, 371, 374; 1853: 87; 1855: 205; 1857: 75; 1859: 93; 1861: 84; 1862: 125; 1865–6: 743.

[60] Cal. Stats. 1850: 353, 360, 375; 1851: 434.

[61] Cal. Stats. 1853: 171, 274; 1854: 237.

[62] Civil Code, § 296.

[63] Cal. Stats. 1859: 281.

Firms Under Fictitious Names. The Civil Code in 1872 provided that on a change of membership in a firm continuing the use of a partnership name the person acquiring the right to use such partnership name must file with the county clerk a certificate stating the name of each person dealing under such name and the place of residence of each member. The clerk was required to keep a register in which he must enter in alphabetical order the name of every such partnership and of each partner therein.[65] In 1874 amendments to the code made these provisions more specific. It is required that every person or partnership doing business under a fictitious name must file with the county clerk a certificate stating the name and residence of each member. The clerk must keep a register in which must be entered in alphabetical order the name of every person doing business under a fictitious name and the name of every such partnership and of each partner thereof.[66]

RECORDS RELATING TO OTHER OFFICERS.

Coroner's Inquests. An act concerning coroners, passed April 19, 1850, required that after the holding of an inquest the "testimony of the witnesses examined * * * shall be reduced to writing by the coroner * * * and * * * filed by him, with the inquisition [verdict of the jury], in the office of the clerk of the district court of the county." But if the person charged with the killing had been already arrested the coroner was to deliver this testimony and inquisition to the magistrate before whom the prisoner was brought, and the magistrate was required to return them to the clerk of the district court.[67] These provisions were incorporated in the Penal Code in 1872, with, however, the "county court" substituted for the "district court" in each case. In 1880 "superior court" was substituted for "county court" and in 1905 "county clerk" was substituted for "clerk of the superior court" in each section. Recognizances of witnesses, when taken by the coroner, were also required to be filed along with the testimony and verdict.[68]

Federal Census Returns. The act of March 23, 1850, which provided for the taking of the seventh and subsequent censuses of the

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[64] Cal. Stats. 1907: 405; Pol. Code (1915), § 4178.

[65] Civ. Code (1872), §§ 2469, 2470.

[66] Code Amended. 1873-4: 253-4; Civ. Code (1915), §§ 2466-70.

[67] Cal. Stats. 1850: 265.

[68] Pen. Code (1872), §§ 1515, 1516; Code Amend. 1880: 35; Cal. Stats. 1905: 709.

United States required that "Each assistant shall, within one month after the time specified for the enumeration, furnish the original census returns to the clerk of the county court of their respective counties, and two copies, duly compared and corrected, to the marshal of the district."

This act applied to all the later censuses until that of 1880. For the census of 1860 there were no changes made in this act, as the only laws enacted regarding the taking of the census were in the appropriation acts. Before the census of 1870, an act was passed extending the time for making the reports, cancelling schedule two, and a few other minor details were changed, all of which is specifically made as amendments to the act of 1850.[70]

For the taking of the census of 1880 a new act was passed, section 6 of which provides:[71]

> "Each enumerator is required immediately after the completion of the enumeration of the population of his district and before forwarding the same to his supervisor to make and file in the office of the clerk of the county court or board administering the affairs of the county to which his district belongs a list of the names with age, sex and color of all persons enumerated by him, which he shall certify to be true, etc."

The laws for all the later censuses have omitted this requirement.

Humane Officers. Section 607*f* of the Civil Code provides a method for the appointment of humane officers by bodies incorporated for the purpose of prevention of cruelty to animals, subject to the approval of the judge of the superior court. An amendment to this section, adopted in 1913, provides that the county clerk shall enter in a book called the "Record of Humane Officers," the name of every officer so appointed, the number of his badge, name of the corporation appointing him, and date of filing of the appointment.[72]

Other Records. Besides the records above enumerated, a number of others are frequently found, for whose presence in the clerk's office there seems to be no very specific statutory or code provision. Among the more important of these the following should be noted: Justice's dockets—for the earlier years there are frequently very interesting and valuable to the student of local history; reports of preliminary hearings in justice's courts—some offices have a large number of these; Notarial records; Coroner's registers; Public administrator's register, reports and account books.

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[70] U. S. Stats., 31st Cong., 1st ses., Ch. XI (1850); 41st Cong., 2d ses., Ch. LV (1870).

[71] U. S. Stats., 46th Cong., 2d ses., Ch. LVII (1880).

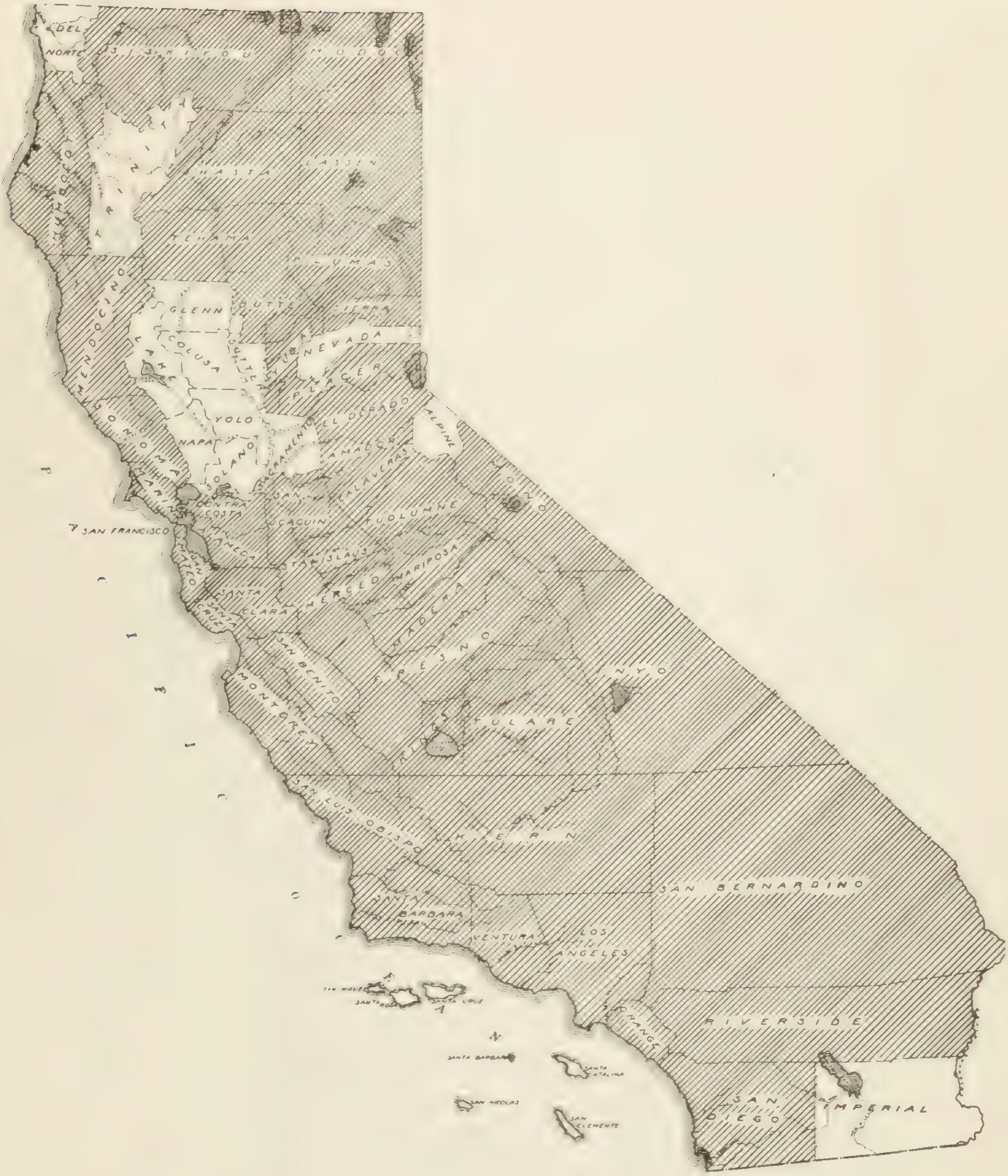
[72] Cal. Stats. 1913: 511; Civ. Code (1915), § 607*f*.

MAP OF CALIFORNIA.

Showing the Counties whose Archives have been Examined.

The map accompanying this report is presented in order to show to what extent the California Historical Survey Commission has been able to prosecute its work of examining and listing the contents of the county archives. Forty-three county courthouses have now been examined and the contents of their offices reported in a manner similar to that shown in the sample reports herewith presented. The remaining counties will be examined during the next few weeks.

As soon as the work in the county archives is completed it is proposed to push forward the following lines of work, part of which have already been under way for some time: (1) A survey of the archives of local federal land offices and state offices; (2) compilation of a report regarding the files of local California newspapers; (3) the preparation of a report upon the records of ecclesiastical, fraternal and business organizations; (4) the listing of the contents of the larger public collections of local history materials; (5) the continuation of the work of discovering and reporting upon the great amount of historical material still in the hands of private parties.


DEL NORTE
SISKIYOU
MODOC
HUMBOLDT
TRINITY
SHASTA
LASSEN
TEHAMA
PLUMAS
MENDOCINO
GLENN
BUTTE
SIERRA
COLUSA
SUTTER
YUBA
NEVADA
LAKE
PLACER
YOLO
EL DORADO
ALPINE
SONOMA
NAPA
SOLANO
SACRAMENTO
AMADOR
CALAVERAS
MARIN
CONTRA COSTA
SAN JOAQUIN
TUOLUMNE
MONO
SAN FRANCISCO
ALAMEDA
STANISLAUS
MARIPOSA
SAN MATEO
SANTA CLARA
MERCED
SANTA CRUZ
MADERA
FRESNO
SAN BENITO
INYO
MONTEREY
TULARE
KINGS
SAN LUIS OBISPO
KERN
SANTA BARBARA
SAN BERNARDINO
VENTURA
LOS ANGELES
ORANGE
RIVERSIDE
SAN DIEGO
IMPERIAL
SAN MIGUEL
SANTA ROSA
SANTA CRUZ
SANTA BARBARA
SANTA CATALINA
SAN NICOLAS
SAN CLEMENTE
PACIFIC OCEAN

PART III.

SAMPLE ARCHIVE REPORTS.

INTRODUCTION.

The two sample reports which are here given as Part III of this preliminary report are merely given as illustrations of the nature of the information obtained and of the form in which the later report upon the county archives will be presented.

The report upon the archives of Humboldt County is given in full and may be taken as an illustration of a complete report upon the archives of one of the counties. The records of Humboldt County have been well preserved from the early years of the organization of that county and hence were chosen for this preliminary report. The report upon the archives of the Recorder of the City and County of San Francisco was chosen to illustrate the method of reporting upon records which antedate the formation of the state government. As will be noted, they are arranged chronologically rather than alphabetically, and are reported with more detailed description. The great loss incident to the fire of 1906 also makes the report upon the archives of San Francisco more valuable. The full report of the other offices of San Francisco will be given in the later report.

What is here given for Humboldt County and for the office of the Recorder of San Francisco is only a small part of the material now in the hands of the commission and could as well have been given for any of the following counties, which have also been examined and the contents of their archives listed: Alameda, Amador, Butte, Calaveras, Contra Costa, El Dorado, Fresno, Humboldt, Inyo, Kern, Kings, Klamath (now defunct), Lassen, Los Angeles, Madera, Marin, Mariposa, Mendocino, Merced, Modoc, Mono, Monterey, Orange, Placer, Plumas, Riverside, San Benito, San Bernardino, San Diego, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Sonoma, Stanislaus, Tulare, Tuolumne, Ventura, and Yuba.

HUMBOLDT COUNTY.

INTRODUCTION.

The territory now within the limits of Humboldt County has, since the organization of the state, been a part of three counties and, for a short time, was loosely joined to a fourth. At the first division of the state into counties, in 1850, all that portion of the state north of 40° was roughly made into two counties, Trinity and Shasta, the summit of the Coast Range being given as the division line. Trinity being almost an unknown region, it was joined to Shasta for judicial purposes.

In 1851 Trinity County was organized independently for the first time, but by then the excitement in the Klamath mining region led to the division of its territory, the northern half being designated and organized as Klamath County. The county seat of Trinity County was fixed at Weaverville. The rapid settlement of the coast region made a further division of the territory desirable, and in 1853 the western portion of Trinity was cut off and formed into Humboldt County. In 1874–1875 the last important change in territory was made when a portion of the disorganized Klamath County was annexed to Humboldt.

The location of the county seat was the cause of much rivalry among the early towns. Uniontown (Arcata) was given the honor in 1853, but the contest continued until 1856, when by act of the legislature the county seat was placed at Eureka. A courthouse and other buildings were not erected until after the removal to Eureka, when a brick building was erected for that purpose, and is still used as a storehouse for some of the old records.

The present courthouse was built in 1886, and stands in the center of a block formerly used as a public plaza. It is constructed of brick and from without is little endangered from fire. The offices of the clerk, recorder and auditor are provided with metal book shelves and filing boxes, in the other offices the fixtures are nearly all of wood, and in them all a fire arising within the building could gain great headway. Some of the records of the clerk and recorder and all those of the treasurer are kept in safes or vaults, but with the exception of the latter office these are large enough for only a small part of the records. Electric lights and a furnace are used.

Most of the offices are now overcrowded and many of the records not in actual use are relegated to the attic or to the old courthouse, where dust, mice or other agencies may do their work of destruction. At the suggestion of the Historical Survey Commission, the grand jury of the county has recommended the construction of a hall of records for the better organization and preservation of the records.

ARCHIVES OF THE CLERK.*

Court Records.

DISTRICT COURT, 1853–1880.

- Calendar, 1853–1879, 2 v. (A–B).
- Execution book, 1865–1879, 1 v.
- File, 1853–1879, 61 f.b., cases 1 to 1418; Tax suits, 1 f.b.
- Grand Jury lists and reports, 1853–1867, 2 large p.h. in the old courthouse; Record of drawings, 1859–1877, 1 v.
- Index, 1864–1880, 2 v., defendants and plaintiffs.
- Insane, order of commitments, 1877–?, 8 f.b.
- Judgment book, 1853–1880, 5 v. (A–E).

  Vol. A also contains entries for county court, 1860–1873.
- Judgment docket, 1853–1880, 1 v. (A).

  Entries before 1868 are copied from an earlier book.
- Jury book, 1873, 1 v., in the attic.
- Minutes, 1853–1879, 6 v. (A–F).
- Register of Actions, 1853–1879, 5 v. (A–E); Index, 1 v.; Delinquent taxes, 1865–1867, 1 v.
- Tax decree book, Sept., 1866–Aug., 1867, 1 v.
- Witnesses and Jurors in district and county court, list of, 1866–1872, 1 v.

COUNTY COURT, 1853–1880.

- Calendar, 1853–1868, 1 v. (1).
- File, 1853–1879, 20 f.b., cases 1–466.
- Judges' fees, county court and insolvents, 1853–1857, 1 v.
- Judgment book, 1860–1873, see under district court.
- Minutes, 1853–1879, 2 v. (A–B).

  Vol. B also contains minutes of court of sessions, 1861–63.
- Register of Actions, 1853–1879, 2 v. (A–B).
- Witnesses and Jurors, 1866–1873, see under district court.

COURT OF SESSIONS, CRIMINAL, 1853–1865.

- Calendar, 1853–1859, 1 v.
- Minutes, 1853–1861, 1 v.; 1861–1863, see under county court, Minutes, B.
- Register of Actions, 1853–1865, 1 v.

SUPERIOR COURT, 1880–date.

- Attorneys, roll of, 1853–1906, 1 v.
- Calendar, 1880–1898, 4 v. (1–4).
- Execution, 1885–1897, 1 v.
- Exhibits: maps, diagrams, pictures and various articles, some of which are historically interesting.
- Feeble-minded persons, commitment of, 1 f.b.

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*The following abbreviations are here employed:

bdl., for bundle;	p. or pp., for page or pages;
cert. copy, for certified copy;	p.h., for pigeon hole;
f.b., for filing box;	v., for volume.

File, 1880–date, 200 f.b., cases 1–7381; Proferts in matter of claims to state lands, 1883–date, 1 f.b.; Writs of habeas corpus, 1873–date, 3 f.b.

Grand Jury reports and court charges, 1890–date, 2 f.b.

Index, general, plaintiffs, 1880–date, 2 v. (1–2); Index to decisions, 1887–1904, 1 v.

Insane Persons, record of orders, 1881–1897, 2 v. (1–2); Index, 1881–1897, 1 v.; Record of commitments, 1897–date, 5 v. (1–5), 1 f.b.; Certificates of discharge, 1903–date, 1 v., 1 f.b.

Judgment book, 1880–date, 7 v. (1–7).

Judgment docket, 1880–date, 4 v. (1–4).

Jury book, 1881–date, 4 v. (1–4); Receipts for jury fees, Civil, 1897–1910, 1 v.; Jury lists, 1907–date, 3 f.b.

Ledger, civil action, 1 v.

Minutes and Orders, 1880–date, 25 v. (1–25); Dept. 2, 1895–date, 10 v. (1–10); Miscellaneous orders of superior court in bank, 1 f.b.; Rough minutes, 48 books in the main office with many others in the attic.

Receipts, stub books of civil, 1891–1901, 1 v.

Register of Actions, 1880–date, 17 v. (1–17); one vol. criminal, 1892–1911, in attic.

Reporter's Notes, large quantity in old courthouse.

Transcripts of Evidence, large number of books in attic and old courthouse.

Superior Court, Probate, and Old Probate Court, 1853–date.

Calendar, 1856–1859, 1 v.

Collateral Inheritance Tax record, 1905–1909, 3 v.

Executors and Administrators, 1858–1859, 1 v.

File, 1853–1879, 24 f.b. by letter; 1880–date, 153 f.b.

Ledger, 1908–1912, 1 v.

Letters of Guardianship and Bonds, 1862–1879, 1 v.; 1880–date, 4 v. (1–4).

Letters Testamentary, Administration and Bonds, 1861–1879, 2 v. (1–2); 1880–date, 8 v. (1–8).

Minors, adoption of, 1 f.b.

Minutes ("Record") of the court, 1853–1879, 6 v. (A–F); Dept. 1, 1880–date, 20 v. (1–20); Dept. 2, 1896–date, 8 v. (1–8). Index, 1 v.

Register of Actions, 1853-1879, 2 v. (A–B); 1880–date, 7 v. (1–7).

Wills, 1855–date, 5 v. (A–E).

Superior Court Juvenile, 1905–date.

File, 1906–date, 4 f.b.

Minutes and Orders, 1909–date, 2 v. (1–2).

Register of Actions, 1905–date, 2 v. (1–2).

Supervisors' Records.

Allowance books, 1885–date, 8 v. (1–8); Index, 6 v.; Claims allowed, 1911–date, 19 f.b.; Claims rejected, 1 f.b.; Orders on county treasury, 1 f.b.

Boundary between Humboldt and Klamath counties, field notes, August, 1872, one pocket note book.

Boundaries of Townships, precincts, road districts, etc., recent, 1 v.; Index to, 1886, 1 small book.

Burial of Ex-Union Soldiers and Marines, 1889–date, 1 v.

Communications received and sent, 1855–1859, several p.h. in the attic; 1865–1875, large amount in old courthouse; State officers, 1 f.b.; District attorney, 1 f.b.; Miscellaneous, 1874–date, 2 f.b.

Election Precincts and Officers, petitions regarding, 1869–date, 1 f.b.

Equalization, Minutes of Board of, 1872–date, 1 v.; File of, 1858–date, 3 f.b.

Erroneous Assessments, petition for cancellation, 1 f.b.

Franchise book, 1853–date, 1 v.

Hospital record, 1 v.; Miscellaneous papers relating to, 1863–date, 2 f.b.; Bids for supplies, 1 f.b.

Indigents, record of, 1886–1903, 1 v., used only for half-orphans; Indigent affidavits, 1 f.b.

Minutes of Court of Sessions, county business, 1853–1855, 1 v. (A); Minutes of supervisors, 1855–date, 15 v. (A–O); Index 2 v. (1–2.

> These records are most useful to the historical worker as they contain information regarding the formation of school and road districts, election districts and the canvass of the returns, etc.

Ordinance book, 1883–date, 1 v. (1); Ordinances, 1 f.b.

Orphans on State Aid, 1904–date, 1 v.

Reclamation districts, 1 f.b.

Road record, 1870–1874, 1 v.; 1887, 1 v.

Road register, 1883–date, 1 v.; Index to road book and register, 1 v.

Roads, bridges, etc.: Bids, 1872–date, 5 f.b.; Claims for damages, 1874–date, 1 f.b.; Petitions, 1852–date, 8 f.b.; Specifications, 4 f.b.; Reports of commissioners, 1862–date, 2 f.b.; Rights of way, deeds, 3 f.b.; Ferries, 2 f.b.

Road Overseers' Accounts, 1855–1869, 4 v.; 1887–1888, 1 v.

Road Survey Field Notes, 70 small pocket note books.

> Nine of these are for the coast road to Mendocino; ten, for the Blocksburg road; and one for the Loud survey, 1868; the others are miscellaneous.

Road Tax Lists and Reports, 1856–1868, in the old courthouse; Assessment lists by districts, 1861, 7 books by townships; 1862–63, several books; 7 books without date.

School District Papers and Records: Assessment roll, Eureka district, 1867, 1 v.; School bonds, 1 f.b.; Petitions, 1859–1889, 1915, 2 f.b.; Miscellaneous papers, 4 f.b.

Supervisors' Miscellaneous Papers: Papers of court of sessions, 1 f.b.; Bids, 1 f.b.; Bonds, 1855–date, 1 f.b.; Courthouse, 1 f.b.; Inventories, 1907–date, 1 f.b.; Petitions, 1862–1894, 6 f.b.; Waterworks, 1 f.b.; Taxes, 3 f.b.; Miscellaneous, 4 f.b.

Miscellaneous Records.

OFFICE ROUTINE AND GENERAL DUTIES.

Appointments, 1 f.b.; Registration clerks, 1 f.b.

Cash book, 1906–1910, 1 v.

Certificates and Proclamations from Secretary of State, 1911–date, 1 f.b.

Fee book, 1878–1883, 1 v.; 1897–date, 2 v. (3–4).

License Account and Salary of Judge and District Attorney, 1868–1872, 1 v.

Licenses, Register of hunting, 1907–1908, 1 v.

Military Lists, 1854, 1861–1867, small pocket note books; 1868–1898, in old courthouse; 1 f.b.

Monthly Balances, 1900–date, 1 f.b.; Monthly reports, 1886–date, 1 f.b.

NATURALIZATION.

Declarations of Intention: District court, 1853–1880, 5 v. (A–E); Superior court, 1880–1906, 7 v. (1–7); Index, 1853–1906, 2 v.

Declarations of Intention, record of, 1906–date, 3 v. (1–3).

Naturalization, acts of, district court, 1869–1879, 1 v. (C); County court, 1869–1880, 2 v.

Naturalization, record of, superior court, 1880–1906, 6 v. (1–6).

Naturalization Petition and Record, 1906–date, 4 v. (1–4).

Naturalized Citizens Index, 1853–1906, 2 v. (1–2).

REGISTRATION.

Affidavits of Registration, 1900–1902, in attic; 1904–1908, in old courthouse; 1910–date, bound by precincts.

Assessor's Returns to County Clerk, 1866–1867, roll of large sheets in the old courthouse.

Cancelled on Great Register, list of names, 1866–1875, 1 v., in the recorder's office.

Great Register, 1866–1909, 20 v.; 1910–date, the affidavits themselves are bound as the register.

Great Register, list of names entered, 1868–1899, 5 v.

Great Registers of other counties, 1869–1888, 164 in number, in attic and old courthouse.

ELECTIONS.

Affidavits relating to, 1 f.b.

Boards of Election, 1869, 1 pocket note book.

Candidates' Statements, 5 f.b.; Verification statements, 2 f.b.

Certificates of Election, 1857, 1 v.; 1865–1888, 1 p.h. in the old courthouse; 1890–date, 1 f.b.

Certificates of Nomination, 1892, 1 p.h. in old courthouse; 1898–1900, 1 f.b.

Challenge List and Returns, 1914.

Election Returns, original, 1853–1872, in old courthouse.

> This material contains some very interesting documents, as all the returns sent in from the precincts for these years have been preserved. Probably the most interesting are the papers relating to the county seat elections in 1854, for among these may be found the original poll list of Angel's Ranch, a very small precinct, which reported 2,136 votes for one of the rival towns.

Poll Lists, 1868, 1869, 1871, in the old courthouse.

Papers relating to elections, 3 f.b.

Primary Election Officers, record of, 1898, 1 v.

Roster of Voters, 1908, in old courthouse.
Tally Sheet of Canvass by Supervisors, 1890.

MARRIAGE AND PUBLIC HEALTH.

Marriage License Affidavits, 1872–1909, 14 f.b., in old courthouse; 1910–date, 3 v. (1–3); Recorder's statements, 1906–date, 1 f.b.
Dental Certificates, register of, 1885–1903, 1 v.; Register of dentists, 1903–date, 1 v.
Medical Certificates, record of, 1876–date, 2 v. (1–2).
Optometrists, registered, 1903–date, 1 v.
Osteopathists, register of, 1903–date, 1 v.
Pharmacists, register of, 1905–date, 1 v.

PERTAINING TO PRIVATE BUSINESS CONCERNS.

Articles of Incorporation, 1853–date, 14 f.b.; Index, 1 v.
Banking Certificates, 1 f.b.
Bonds of Corporations, record of official, 1868–1875, 1 v. (B).
Bond and Surety Companies, record of, 1 v.
Certificates of Insurance, 2 f.b.
Partnerships, register of, 1874–date, 1 v. (1); Certificates of, 1 f.b.
Private Account Books:
  Eureka Restaurant, 1853–1856, 5 books.

  In one of these the entries show that during April, 1854, this restaurant purchased $243.60 of elk meat.

  Hull & Monroe, butcher and produce business, 1860–1861, 3 v.
  Eureka Bakery, Chas. Wiggins, 1875–1877, 2 v.
  Southmayd, Ledger of, butcher business, 1877, 1 v.
  Biggs, S. F., ledger of, liquors, 1883–1887, 2 v.
  Mary Blaine Mine, 1884, set of four books.
Rural Cemetery Associations, record of, 1909–date, 1 v.; Incorporation of, 1 f.b.
Sole Traders Applications, 1871–date, 1 v.

RELATING TO OTHER OFFICERS.

Auditor's Reports and Statements, 1 f.b.
Bonds, official, 1853–1894, 4 p.h. in old courthouse.
Coroner's Inquests, 1859–date, 22 f.b.
Coroner's Register, 1893–date, 1 v. (1).
Horticultural Commissioner's Reports, 1 f.b.
Justice's of Peace Dockets, Eureka township, 1861–1870, 1872–1876, 7 v.; Bucksport township, 1853–1879, 1 v.; Tax suit docket, 1862, 1 v.
Justice Court Papers: Civil, 1 f.b.; Criminal, 2 f.b.
Miscellaneous Reports, 1859–date, 2 f.b.
Notaries, register of, 1888–date, 1 v.
Notarial Records, 1905–1913, 10 v.
Oaths of Office, 1 f.b.
Public Administrator, register of, 1883–date, 2 v. (1–2); Account book of public administrator, 1889–1892, 1 v.; Semiannual reports, 1908–date, 1 f.b.

Treasurer's Reports, 1900–date, 1 f.b.

United States Census Enumerators' Field Notes, 1870, 1 bdl. in old courthouse.

These are the original notes of the census marshal and are most valuable in giving the data from which the reports were compiled as the names of each individual is given with the data as obtained.

United States Census, 1880, list of persons residing within districts, 24 books, in the recorder's office.

These contain merely a list of the inhabitants with no further data as given in the earlier census.

ARCHIVES OF THE RECORDER.

Architects, record of, 1901–1906, 1 v.

Assignments of Mortgages and Leases, index to, 2 v.

Attachments, record of, 1855–date, 5 v. (1, B–E); Index, 1 v.

Banking Assets, statements of, 1876–1893, 1 v.; 1 f.b.

Semiannual report of financial condition of banks.

Bankruptcy and Insolvency Papers, 1 f.b.

Births, register of, 1856–1859, 1 v.; 1873–1902, 1 v.; 1902–date.

Building Contracts, etc., mostly recent, 12 p.h. in map case; 1 f.b.

Certificates of Sale under Execution, 1853–date, 4 v. (A, 1–3); Index, 1 v.

Deaths, register of, 1873–1880, 1889–1898, 1 v., incomplete; Record of, 1905–date, 3 v. (1–3); 1 f.b.

Decrees of Distribution, index to, 1874–date, 1 v.

Decrees are recorded in deed books.

Deeds, 1854–date, 158 v. (A–Z, 1–132), volume ''A'' is entitled ''Record of town lots of Humboldt Co.,'' 1860–1865; ''B'' begins with July 29, 1854. In addition to these volumes is another, ''Green Book, Deeds, City of Eureka,'' containing entries for 1850.

Election Expenses, candidates' statements, 1894–date, 5 v. (1–5); Candidates' statements, primary elections, 1912–date, 2 v. (2–3); indexed; Committees' statements, 1894–date, 2 v. (1–2).

Estray book, 1861–date, 1 v.

Fee book, 1873–74, 1 v. in attic; 1883–date, 16 v.; also an ''Account Book of County Recorder,'' 1876–1877, containing record of fees, had formerly been used as a farmers' journal.

Homesteads, register of, 1860–date, 7 v. (1–7); Index, 1 v.

Indian Indentures, 1860–1862, 1 bdl. of 105 documents in the old courthouse.

Land Claims, swamp and overflowed lands, 1853–date, 1 v.; Index, 1 v.

Leases, 1907–date, 2 v. (1–2); Index, 1863–date, 2 v.

Lis Pendens, 1855–date, 5 v. (A–E); Index, 1 v.

Maps and Plats: Map books, 11 large volumes; Index, 1 v.; Maps of surveys, 1891–date, 6 v. (1–6) Index, 1 v.; Block books of Eureka, 1861, 1862, 1866, Eureka and Arcata, 1863, 1864, 1865; also a few undated volumes.

Maps—Mounted: Trinidad, 1871; Eureka, 1888, 1901; Humboldt Co., 1898.

Maps—Miscellaneous unmounted and unbound, about a dozen.

> Many of these maps are very interesting, *e. g.*, Map of Humboldt City, 1850; Map of Hooktown; Eureka waterfront, 1870, and many road survey maps.

Marks and Brands, 1853–date, 3 v. (A–C); 2 boxes of brands burned on leather.

> Book A begins with the brand of John Kneeland, originally filed in Trinity County; Book B is more detailed, giving record of transfer of brands of cattle and also contains brands for butter.

Marriage Register, 1859–1866, 1873, 2 v.; Record of marriages, 1854–1858, is in "Sole Traders Declarations," pp. 1–31.

Marriage Certificates and Licenses, 1873–date, 15 v. (C–Q); Index, 1864–1872, 1 v. (A), also contains record of one license as well; 1873–date, 6 v. (B–D).

Mechanics' Liens, 1854–date, 4 v. (A–D).

Mining Claims and Water Rights, 1874–date, 5 v. (1–5); another volume, 1874–1890, copied into v. 1; Index, 2 v.

Miscellany, 1853–date, 5 v. (A–E); Index, 1 v. (1); also another, "County Records of Humboldt County, Bk. A," 1853–1854.

> As the title implies, this set of records contains many kinds of documents, some of unusual interest, viz., the agreements of the various speculation companies which took up the lands on the bay in 1850; the Bucksport Land Claim Association; the articles of the Humboldt Lumber Manufacturing Co., 1854, etc.

Mortgages, 1859–date, 100 v. (A–Z, 1–74); Index, 12 v. (1–6).

Mortgages—Chattel, 1866–date, 14 v. (A–N); Index, 2 v. (1).

National Guard of California, register of 10th Bat. of Inf., 1879.

Newspaper Files, in the office of the County Clerk, except as noted below:

- *Humboldt Times* (Weekly), July 14, 1860–Dec., 1897, 28 v. Files appear complete between these dates except vols. 9, 20, 24, 25, 27, 30, 33, 36, and 37.
- *Northern Independent*, July 22, 1869–July 13, 1871, 2 v.
- *Telephone—Weekly*, Dec., 1881–Dec., 1882, 1 v.
- *Times-Telephone*, 1884–1885, 2 v. (30–31).
- *West Coast Signal*, Feb., 1871–Feb., 1874, 3 v. (1–3).
- *Sacramento Reporter*, 1870–1872, unbound, in the old courthouse.

Official Bonds, record of, 1853–date, 8 v. (A–H); Index, 2 v.

> Vols. A and B are entitled, "Records of the Co. Clerk."

Oyster Beds, record of, 1893–date, 1 v.

Patents, record of, 1860–date, 21 v. (1–21); Index, 2 v.

Powers of Attorney, 1853–date, 6 v. (A–F); Index, 1851–date, 2 v.

Releases and Satisfaction of Mortgages, 1907–date, 3 v.; Index, 1888–date, 4 v. (1–2).

Redemption, certificates of, 1 f.b.

School Land Warrants, record of, 1858–1862, 1 v. in clerk's office.

Separate Property of Married Women, 1864–date, 1 v. (A).

Sole Traders, 1859–1892, 1 v. (No. 1).

> Pages 1–31 of this book contain record of marriages, 1854–58.

(Special) Partnership Record, 1873–date, 1 v. (1), indexed.

Stallion Register, "Propagation License Certificates," 1912–date, 1 v.

Survey of Boundary between Mendocino, Humboldt and Trinity counties, 1891, 1 v.

This consists of 54 typewritten pages, describing the country crossed by the surveyors, incidentally giving much information regarding the condition of the country, settlements, etc.

Surveyors, register of licensed, 1891–date, 1 v.

Tax Deeds, 1875–date, 7 v. (1–7); Index by grantors, 1 v.

Transcripts of Judgments, 1 v.

Transcripts from the judgment docket, showing liens against real property.

Transcripts of Judgments Rendered by Justices of Peace, 1855–1882, 1 v., indexed.

"Trinity County, Cal., Record Book, No. 1." Aug. 1850–Mar. 1851, 1 v.

Most of the entries are deeds to lands around Humboldt Bay; it also contained, unbound, a number of sheets or pages of preemption claims.

Trust Deeds, 1911–date, 2 v. (1–2).

"Union, Record Book of the Town of," 1851–1853.

The first entry in this book contains the poll list and the results of an election held at Uniontown April 1, 1851, at which time 110 votes were cast. The last entry is dated Oct. 5, 1853.

Wills, record of, 1880–date, 1 v.; Index, 1854–1873; 1883–date, 2 v.

ARCHIVES OF THE SUPERINTENDENT OF SCHOOLS.

Annual Report of the condition of the common schools of Humboldt County, 1871–date, 10 v.

These are reports sent to the Superintendent of Public Instruction and consist of about 24 pages each. They are later bound in groups of three years each and kept on file. Among other things they contain the names of private schools in the county; census statistics; school and financial statistics; a statement of school property (the earlier reports give even the location of the schoolhouse); miscellaneous statistics; certificates granted; etc. The later forms are somewhat different but of the same general nature.

Apportionment of Funds, 1893–1899, 1 bdl. in old courthouse.

Applications for certificates, life diplomas, etc., 1 f.b.

Auditor, communications from the, 1887–date, 1 drawer.

Board of Education, record of, 1880–date, 2 v.

Census Marshal's Field Notes, 1891; 1909, in old courthouse; 1910.

Give name, age, etc., of each child in the school district and county.

Census reports, 1882–1884, 1886–1888, 1899–1901, 1903, in old courthouse; 1905–1910, 7 f.b.

These are abstracts from the field notes giving the names of the parents with the number of children between 5 and 17.

Certificate Books:

High school certificates, 1891–date, 5 v.;
Grammar-grade on credentials, 1887–date, 5 v. (2–6);
Grammar-grade on examination, 1887–date, 4 v. (2–5);
Second-grade, 1880–1893, 1 v.;

Primary, 1887–1901, 4 v.;
Special, 1891–date, 5 v.;
Other books containing a few temporary and other certificates of scattering dates.

County Superintendent of Schools, record of accounts of, 1897–date, 16 v.

These follow the school district accounts and are practically the same in form. The accounts are arranged by districts showing the amounts drawn out and the balance.

Course of Study in Humboldt County Schools, 1888, 1892, 1895–96, 1897–98, several printed copies.
District Clerks, communications from, 1 file.

These are filed in a cabinet under the names of the various districts.

District Clerk's Papers, 3 p.h. in old courthouse.
Life diplomas, recommendations for, 1889–date.

These are the stubs of recommendations made to the State Superintendent. They are divided into two classes—first grade and grammar grade.

Maps of Humboldt County, 1886 (Forbes); 1893 (Lentell).

Official maps; both have much early information; used to show the school districts.

Miscellaneous Papers, 4 p.h. in old courthouse.
Requisition Stubs, 1891–date.

Stub book of orders on the treasury and correspond with the record in the school district accounts, etc. Arranged by years and districts.

School District Accounts, 1871–1897, 6 v.

Same series as the Record of Accounts of the County Superintendent.

School Districts, boundaries and description of, 1885, 1 v., (printed).
School District Ledger; General expenses, 1864–1871, 1 v.; Building fund, 1867–1871, 1 v.; both in old courthouse.
School Districts, maps of, 3 maps.

The first is an old hand-ruled map undated; another on the Lentell map of 1893 and a larger one for the present time.

Superintendent of Public Instruction, communication from, 1905–date, 1 drawer in the filing cabinet.
Superintendent's Requisitions, register of, 1889–date, 5 v.
Teacher's Contracts, current, 1 f.b.
Teachers, notices of employment of, current, 2 f.b.
Teachers' Reports, 1877–date, 1 v.
Trustees, oaths of office of, 1 p.h. in old courthouse.
Trustees, register of school, 1886–1890, 1910–date, 2 v.
Trustees, certificates of election, 1906–date, 4 f.b.
Trustees' Reports, 2 p.h. in old courthouse.
Warrants, register of School, 1873–1889, 2 v.; Stub books, 175 in old courthouse.

ARCHIVES OF THE AUDITOR.

Assessment Rolls: "Tax List," 1853–1854, 1 v. in attic; "List of Taxable Inhabitants," 1854, 1 v. in the clerk's office; "Assessment Roll and Military Tax," 1855, 1 v., in the clerk's office; Assessment rolls, 1855, 1866, 1877, 3 v., also in the clerk's office; 1860, 1862–date, 85 v.; Index to assessment rolls, 1881–1890, in attic; 50 v. in main office.

Assessment Rolls, delinquent, 1872–date, 43 v.; "List of Property Tax Unpaid," 1858–1860, 3 v., in clerk's office.

Assessment Rolls, duplicate, 1872–1884, 26 v., in attic; 1864, 1 v., in clerk's office.

Assessment Roll, personal property, 1896–date, 19 v.

Auditor's Account Books; 1872, 1 v. in clerk's office; 1883–1891, 2 v.; Accounts with sheriff and assessor, 1853–1858, 1 v., in clerk's office; Accounts with treasurer, 1858–1868, 1 v., also in the clerk's office.

Auditor's Ledger, 1859–1875, 2 v. (A–B); 1880–1887, 1 v. (D).

Auditor's Register of Accounts, 1870–1880, 2 v. (A–B) in clerk's office.

Cash Book, 1897–1905, 1 v., in clerk's office.

Certificates Filed and Warrants Drawn, 1853–1859, 1 v. in attic; 1859–1871, 1 v. in clerk's office.

Dependents Outside Institutions, abstract of, 1913–date, 1 v.

File of Miscellaneous papers, bills, etc., 70 f.b.

Financial Statements of County Officers, 20 f.b.

Indigent Account, 1896–1908, 1 v.; Monthly allowance record, 1907–date, 1 v.

Land Payments, record of, 1885–1906, 1 v.

Licenses, 1889–date, 2 v. (1–2); Licenses issued, 1883–1897, 3 v. (2–4), in attic.

Licenses Received from State Controller, 1855–1860, 1 v. in clerk's office.

License Tax Collector's Reports, 1878–1899, 1 v. in old courthouse.

Miscellaneous Papers; old warrants, accounts allowed, tax receipts, etc., 17 boxes in old courthouse.

Orphans' Claim Record, 1907–date, 2 v.

Orphans and Half-Orphans on State Aid, 1907–date, 2 v.

Poll and Military Tax Lists, 1883–date, 32 v.

Receipts, 1858–?, one large p.h. in old courthouse; Orders and receipts, stub book, 1888–1890, also in old courthouse.

Reports, 1854–1892, one large p.h. in old courthouse; 1870–1875, 1 v., in attic.

School District Accounts, 1880–1898, 3 v.; School ledger, 1899–date, 2 v.

School District Assessment Rolls, 1871–1873, 2 v.

School Land Warrants, index to, 1853–1856, 1 v.

School Warrants, register of, 1908–date, 2 v.; Cancelled warrants, 1908–1911, 10 bdls. in old courthouse; 1912–date, several bdls.

Sheriff's Fee Book, 1897–1901, 3 v. (2–4).

Swamp Lands, record of receipts on, 1858–1863, 1 v., in the clerk's office.

Tax Sales, certificates of, 1885–1892, 3 large p.h. in the old courthouse.

Tax Sales, record of, 1872–1910, 20 v. (1–20); Index, 2 v.

Tax Collector's Receipts from Licenses, 1875–1881, 1 v. in the clerk's office.

Treasurer in Account with the Auditor, 1853–1856, in the clerk's office in a book, "Certificates of Election," 1–20.

Treasurer's cash book, 1860–1893, 8 v. (A–H); 1896–date, 7 v. (1–7).

Treasurer's reports, 1859–1888, 1866–1870, 1899–1905, 3 v. in the old courthouse.

Warrants, register of, 1 v. (A); 1871–1874, 1909–date, 7 v. (B, D, J–N).

Warrants redeemed, 1853–1858, 1 v. in clerk's office; Stub books, 1904–date, about 20 v.; Stub books of court warrants, about 30 in old courthouse.

ARCHIVES OF THE TREASURER.

Account book, general, 1853–1856, 1 v.; Miscellaneous accounts, 1890–date, 1 v.

Apportionment of Funds, 1899–date, file.

Bonds of Humboldt County, record of, 1893, 1 v.

Cash Book, 1859–1895, 21 v. in old series; 1895–1908, 8 v. (A–H); 1908–date, 4 v. (1–4).

Day Book, 1853–date, 10 v. (1–10).

Depository Register, 1910–date, 1 v.

A record of county money deposited in banks.

Inheritance Tax Receipts, 1897–date, 4 v., stub books.

Ledger, 1853–1856, 1 v. (1); 1867–date, 6 v. (A–F).

License and Poll Tax Accounts, 1868–1885, 1 v.

Miscellaneous papers, one drawer.

These consist of auditor's receipts; cancelled bonds; school apportionments, 1868–1890; rates of taxation, 1867–1882; Report of Klamath County Commissioners; etc.

Public School Teachers' Permanent Fund Record, 1914–date, 1 v.

Road Warrant Register, 1876–1909, 5 v., scattering.

School District Accounts, 1874–1891, 4 v. (A–D); Transfers ordered by supervisors and superintendent of schools, 1886–date, filed.

School Warrants, 1889–1894, 1 v.; 1909, 1 v. (F).

State Lands, Record of, 1858–1867, 1 v.

This gives the number of the location, name of the purchaser, class of land (school, swamp and overflowed, etc.), township and section, number of acres, date of location, and record of payments.

Warrants Registered, 1858–1874, 2 v.; 1874–1891, 4 v. (B–E); 1891–1911, 8 v. (A–H).

ARCHIVES OF THE ASSESSOR.

Assessment Statements, 1859–1899, 333 large p.h. in the old courthouse; 1900–date, in p.h. in main office.

These are the signed statements of the property owners, arranged by townships and years.

Lands Sold in Humboldt County, abstract of, 1871–1888, on large unbound sheets in the old courthouse.

These lists show whether the land was sold under the law governing cash sales, homesteads, preemptions, swamp and overflowed lands, etc. They also give name of purchaser, section and township, and acreage.

Mortgages, abstract of, 1871–1883, 1 v.; 1880, 1882, 2 v. in the recorder's office; 25 other vols. in the old courthouse.

Mortgages, record of, 1888–1910, 1 v.

Poll Tax Books, 1910–1914, several books; there are also about 130 of these books in the old courthouse and some in the attic; Receipt books, several in the attic; Stub-books, for several years.

Poll Tax Lists, 1864–1870, 1875, 8 v. in the old courthouse.

These are alphabetical lists of persons who have paid their poll tax.

Real Estate Record, n.d., 1 v., in clerk's office.

Shows alphabetical list of land owners with location of their lands.

State Land Office, returns from, 1875–date.

These are on large sheets, giving the name of the purchaser with a description of the land. Before 1902 they are in a large roll; since then, folded by years.

Transfer book, 1881–1884, 1886, 1888–date, annual volumes.

United States Land Office, "Record of Final Proofs," 1903–date.

Taken from the record of patents in the land office.

Maps and Plats.

Maps of Property Holders, current, 7 v., also a number of maps, mostly town properties, on sliding boards.

Plat Books of Eureka, 3 v., about 1869 or 1870 and 1880 in old courthouse; Map of Eureka, 1881, showing location of property owners, scale 160 ft. to inch; another on some scale about 1890.

Special Properties, maps of, recent.

Several miscellaneous maps of special properties such as railroads, lumber companies, etc. In the case of the latter the areas cut off during each year are indicated on the map.

School Districts, map of, current.

Trinidad, map of, n.d.

ARCHIVES OF THE TAX COLLECTOR.

Assessment Rolls, current.

Cash Book of Tax Collector, 1881–1883; 1891–date, 26 v.

Delinquent Tax Cash Book, 1881–1891, scattering, 7 v.

Licenses, Cash Account of, 1897–date, 2 v. (5–6).

Licenses Collected, ledger of, 1885–date, 7 v. (3–9).

Tax Sales, record of, 1873–1894, 4 v. (A, 1–3).

CITY AND COUNTY OF SAN FRANCISCO.

Archives of the Recorder.

Pre-Statehood Records, 1838-1850.*

MEXICAN PERIOD, with later records in Spanish.

1. "Spanish Records, Liber 1," Nov. 26, 1838–May 23, 1851. 1 v., 44 pp., 9x15 in. Indexed.
   Copy and translation of part in No. 16, pp. 243–302.
2. "Spanish Blotter, B," [May 1, 1839–August, 1846.] 12 pp., 7½x 12. In paper covers, badly worn; tied in canvas boards.
3. Copy of same; 32 photographs. 2 v., 10½x13 in.
4. Duplicate of No. 3.
5. Copy with translation (Dec. 10, 1849), labeled, "Spanish Record, B," 32 pp., 9½x15 in.
   Copy and translation in No. 16, pp. 304–325.
   Copy in No. 17, pp. 75–88.
6. "Blotter of Official Notes of Fco. Guerrero, while Alcalde at different times, 1839, 1840, 1841, 1842, 1843." May 15, 1839–Oct. 5, 1843. 22 pp., 8x12. Bound in pasteboards and tied in canvas-leather binder.
   Copy in No. 17, pp. 1–73.
7. "Original Grants, A," Nov. 12, 1839–Apr. 30, 1847. 367 pp., 7½x12 in.

   Inside title, "Land Records with titles to lots in the town of Yerba Buena." The early records are Spanish, later ones English. In this copy the first page is missing.
8. Cert. copy (1864), 367 pp., 9x15 in.
9. Index to original grants, Oct., 1846–April, 1850. 275 pp., 8½x 15 in.
10. Copy, 626 pp., 10½x17 in.
11. "Blotter of Official Notes . . . from the Alcalde of San Francisco, 1846." Mar. 5, 1846–June 15, 1846. 18 pp., 8½x12 in. Tied in canvas boards.
    Copy in No. 17, pp. 91–118.
12. "Spanish Records, Liber A." Los Angeles, July 29, 1846–Jan. 14, 1850. 70 pp., 7½x13 in.
13. Copy, 37 pp., 7½x13. Pages 1–58 of No. 12.
    Copy and translation in No. 16, pp. 1–86.
14. "Transfer of Deeds, Liber A," for Register of Deeds of Sale, Dist. of San Francisco. Oct. 10, 1846–Jan. 7, 1848. 347 pp., 7½x 12½. Reverse is "Record of title to lots under Mexico, Entry No. 1, grant to Hudson Bay Co., Sept. 9, 1841." 81 pages, partly used.
15. Cert. copy, "Transfer Deeds A." 348 pp., 9½x15 in. Reverse 21 pp., 9½x15 in.
16. "Spanish Records—Translation and Index." 362 pp., 10x16½ in.
    Copies and translations of following documents:

    pp. 1–86, "Bk. A of Spanish Records" (No. 12);
    pp. 88–122, "Bk. B of Span. Records" (No. 22);

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*These records are here listed chronologically, each volume being assigned a serial number.

pp. 124–240, "Lib. A of Original Grants" (in Spanish) (No. 7);
pp. 243–302, "Lib. 1, Span. Records." Copy and translation. Not all of original. (No. 1);
pp. 304–325, "Spanish Blotter, B." (No. 2);
pp. 326–371, "Transfer Deeds, A." Not, however, a copy of No. 14, as the entries are for earlier dates, Jan. 21, 1844–May 18, 1846. (Recorded in 1853.)

17. "Official notes—Spanish Blotter, B, Transfer Deeds, Investigation, Index A B C, Release Deeds." 229 pp., 11½x17 in. Originals copied in good hand, but neither certified to nor translated. Contents are as follows:

pp. 1–73, Blotter of official notes of Fr'co Guerrero, while Alcalde. (No. 6);
pp. 75–88, Spanish Blotter, B. (No. 2);
pp. 91–118, Blotter of official notes . . . 1846 (No. 11);
pp. 121–126, Investigation of a complaint made by Rosa Archuleta *vs.* Francisco Rochin, her husband, 1846.
pp. 128–137, Miscellaneous transfer deeds and district deeds, Book B, "O.K.". (No. 19);
pp. 138–229. Index to Books A, B and C of transfer deeds, 1846, 1847, 1848, 1849.. (No. 20).

EARLY AMERICAN PERIOD.

18. "Ledger of Alcalde," Aug. 15, 1846–Sept. 27, 1847; 33 pp., 8x13.

Very good, as it gives account of all moneys handled, with names and reasons for transfer; also notes justifying action. First page has copy of letter from Stockton authorizing use of public money.

19. Miscellaneous Transfer Deeds and District Deeds, Book B, "O.K." Nov. 29, 1847–July 5, 1848. 11 pp., 8x12 in. Bound in canvas-leather boards. Contains also the following:

4 pp., Index to Original Grants (No. 9);
8 pp. Jusgado do las Constitutional del P. de San Jose de Guadeloupe. Ano de 1846.

20. Index Book, A, B, C of Transfer Deeds and Release Deeds, 1846–7–8. 25 pp., 8x13, bound in pasteboards, tied in canvas-leather cover.
21. Miscellaneous, 1846. Two marriage entries, remainder an index to lot holders in San Francisco, No. 1–715. 200 pp., 8x13.
22. Spanish Record, B. Feb. 9, 1847–Apr. 30, 1850. In Spanish. 33 pp., 8x13.
23. Copy, 33 pp., 9½x15.
Copy in No. 16, pp. 88–122.
24. "Brand Book, No. 1," June, 1847–Jan. 16, 1901. 32 entries. 19 pp., 7½x13 in.
25. "Water lots, B," July–Sept. 14, 1847. 181 pp., 7½x11½ in. Leather.

Lots sold at auction by Alcalde Hyde, under grant of Gov. Kearney (Monterey, Mar. 10, 1847).

26. Cert. copy (Mar. 10, 1863), 182 pp., 9x15 in.
27. Water Lots, B–C, Sept. 20–Dec. 7, 1847. 320 pp., 7½x11½.
28. Cert. copy (Mar. 10, 1863), 333 pp., 9x15 in.
29. Copy. 320 pp. Outside title, "Records."
30. Original Grants, B, Aug. 31, 1847–Oct. 15, 1849. 80 pp., 7½x 12½ in.
31. Cert. copy (April, 1863). Good penmanship. 80 pp., 9½x 15½ in.
32. Miscellaneous, AA, Sept. 6, 1847–Jan. 18, 1851. 172 pp. 8x 15 in.
33. "District Record, Liber B, DR.," Nov. 29, 1847–Aug. 12, 1849. 75 pp., 9x14 in. Land records.
34. Cert. copy (1864), 75 pp., 9x15.
35. Transfer Deeds, Book B, Feb. 1–Sept. 9, 1848. 217 pp., 7x15 in.

In back are 1½ pp. of "Notes on California" by Alcalde Hyde.

36. Copy, 216 pp., 8x14 in. (Outside title, "Records.")
37. Copy, 217 pp., 9x15 in. Good penmanship.
38. "Land Titles, C." Sept. 18, 1848–Apr. 6, 1849. 371 pp., 10x 15 in. Evidently a continuation of "Transfer Deeds, B."
39. Miscellaneous Records, 2, Dec. 13, 1848–June 25, 1849. Mostly preemptions, etc. 71 pp., 9x13 in.
40. Miscellaneous, 1849, May 5–Dec. 6, 1849. 36 pp., 9x15 in.
41. Miscellaneous, BB, June 8, 1849–May 7, 1850. 221 pp., 8x14 in. Indexed.
42. Copy, 221 pp., 8x13 in. (Outside title, "Records.")
43. District Record, Blotter B. 63 pp., 7½x12 in. Paper cover bound in canvas-leather cover. Sale of lots, July, 1849.
44. Copy, 63 pp., 11x18 in.
45. Almond Records, Liber A, Oct. 8, 1849–Feb. 1, 1850. 338 pp., 7½x12 in.

A set of miscellaneous records, the most of which were kept by W. B. Almond, Judge of First Instance.

46. Copy, 338 pp., 8x13 in.
47. Almond Records, B, Dec. 21, 1849–Apr. 13, 1850. 317 pp., 7½x 12 in. With index.
48. Copy, 317 pp., 8x13 in.
49. Sat[isfaction of] Mort[gages], A, Oct. 8, 1849–Jan. 24, 1852. 292 pp., 8x12 in. Indexed.

Alcalde Deeds. 5 v. in printed forms, as follows:

50–1. 50-vara lots, Nov.–Dec., 1849. 2 v. 250 pp., 7½x9 in.
52. 100-vara lots, Dec., 1849. Deeds, 171–240. 200 pp., 7½x9 in.
53–4. Water Lots, Jan., 1850. 2 v., 200 pp., 8x10 in.

"Certified Grants," certified transcripts of Alcalde Deeds, 5 v. (I–V).

55. Vol. I, 100-vara lots, 1–305;
56–7. Vol. II–III, 50-vara lots, 9–699; 700–1439;
58–9. Vol. IV–V, Water Lots, 1–444; 400–771.
60. Mission Book Ledger, Jan. 5, 1850–Sept. 27, 1850. 150 pp., 9x15 in.

Record of pre-emption (squatter's) claims in S. F.

Later Records. 1850–date.

Assignments of Mortgages, Apr. 4, 1906–date, 9 v. (1–9); Index, 1 v. (1).

Attachments, Sept. 5, 1850–July 18, 1856, 1 v. (1), in the vault; Mar. 28, 1906–date, 17 v. (1–17); Index, 2 v. (1–2).

Architects, July 16, 1906–date, 1 v. (1); Index, 1 v. (1).

Building Contracts, index to, 1906–date, 6 v. (1–6).

Building Costs, record of, c. 1880, 1 v. in the vault.

This is a record probably prepared to estimate the value of the improvements on property condemned by the city. It has no date, but probably belongs to the '80s.

Cash Books, 1906–1914, in basement; 1914–date, 2 v.

Certificates of Sale, Apr. 6, 1906–date, 4 v. (1–4); Index, 2 v. (1–2).

Covenants, Apr. 3, 1906–date, 52 v. (1–52); Index, 5 v. (1–5).

Deeds, May 31, 1849–Aug. 26, 1850, 11 v. (A–B, D–H, K–N).

These do not form a chronological series as several books were kept open at the same time. The earliest entry is in "D," while the latest is in "A."

Deeds, Aug. 28, 1850–July 27, 1854, v. (1–39); Feb. 19, 1859–Feb. 9, 1860, v. (91–98); Aug. 24, 1861–Feb. 11, 1864, 84 v. (141–223, 226); Sept. 18, 1894–Sept. 20, 1895, 31 v. (1627–1657); June 14, 1895–Aug. 19, 1898, 42 v. (1659–1700); July 20, 1897–Sept. 22, 1898, 41 v. (1746–1786); June 30, 1898–April 3, 1906, 394 v. (1788–2136, 2138–2166, 2168–2176, 2178–2179, 2181–2182, 2184–2186); Index, 71 v. (1, 2, 28, 39–43, 87–149).

These books, covering the period before the fire of 1906, are considered the old series.

Deeds, April 3, 1906–date, 960 v. (1–960); Index, 70 v. (1–35).

These records, which constitute the new series, are seen to begin with the unentered documents in the possession of the recorder at the time of the fire of April 18, 1906. All the public records for April 12, 13, 14 and 16 were destroyed, those of the 17th were saved.

Decrees of Distribution, index, 1906–date, 2 v. (1–2).

The decrees are recorded with Deeds.

Documents Recorded, record of number of, 1862–1863, 1876–1877, 1882–1884, 1 v., 30 pp.

Franchises, Sept. 2, 1909–date, 1 v. (1).

General Index, May, 1850–1913, 296 v. (1–296); 1913–1915, 30 v. (1–30); 1916, 30 v. (1–30).

Homesteads, Apr. 3, 1906–date, 10 v. (1–10); Index, 1 v. (1).

Leases, Apr. 4, 1906–date, 61 v. (1–61); Index, 4 v. (1–4).

Licensed Surveyors, state, 1891–date, 1 v. (1).

Lis Pendens, Apr. 2, 1906–date, 109 v. (1–109); Index to notices of action—general, 3 v. (1–3);—to quiet title, 6 v. (2–7).

Marriage Certificates, May 2, 1906–date, 22 v. (1–22); Index, July, 1904–April, 1906, 2 v.; April, 1906–date, 1 v. (1).

Marriage License Books, April 17, 1906–date, 140 v. (1–140).

Marriage Licenses delivered, 1914–date, 2 v. (1–2).

Maps and Plats: Block books of titles acquired by land owners' affidavits, 14 v.; Block books of titles by lis pendens, 16 v.; Block books of assessor, 1915, 23 v., photograph copies of the original 41 vols.; Block book, 1871; Laguna survey, 1889, certified copy. Licensed surveyors' plats, 1908–date, 1 v. (1). Maps of street extension and improvement: Stockton Street tunnel, 1912, a map book, with list of property owners affected, benefited, etc., with area of property; Twin Peaks tunnel, report of Board of Works on, Vol. III, being a map book; Street extension maps for Arch, Beverly, Bixby, Bright, Montecello, Ralston, Ramsell, Vernon and Victoria streets, and Orizaba ave., dated July, 1914, and Vulcan st., November, 1914. Map Books, 6 v. (1, 2 a–b, C–D, E–F, G, H), with two certified copies of "1" and "2," one certified copy of each of the others except "H." Maps of subdivisions on cloth, folded: Syndicate, West End, Homestead and Bernal Homestead Association, Dec., 1913; Excelsior Homestead, recorded Feb., 1914; Mission District, in part, Sept., 1914. Index to maps filed and recorded, 1853–1889, 1 v.; 1853–1912, 1 v.; 1853–date, 1 v.

Mechanics' Liens, Apr. 3, 1906–date, 80 v. (1–80); Index, 4 v. (1–4).

Mining Locations, April 7, 1914, 1 v. (1), contains one entry.

Miscellany, April 2, 1906–date, 81 v. (1–81); Index, 10 v. (1–10).

Mortgages, Nov. 8, 1895–Apr. 4, 1896, 1 v. (1136); April 3, 1906–date, 460 v. (1–460), new series; Index, 1905–1906, 1 v. (62); Index, new series, 24 v. (1–24).

Mortgages on Personal Property, Mar. 31, 1906–date, 95 v. (1–95); Index, 4 v. (1–4).

[Official] Bonds, Apr. 10, 1906–date, 3 v. (1–3); Index, 1 v. (1).

Ownership, notices of, May 13, 1907–date, 11 v. (1–11); Index, 1 v. (1).

Under act of Mar. 23, 1907.

Papers on File, index to, Mar. 1, 1899–1902, 26 v.; 1902–1904, 28 v., building contracts only; 1904–1906, 30 v.

Patents, Aug. 1, 1906–Mar. 24, 1910, 1 v. (1), in vault.

Powers of Attorney, April 6, 1906–date, 11 v. (1–11); Index, 1 v. (1).

Releases of Mortgages, Apr. 4, 1906–date, 88 v. (1–88); Index, Dec., 1905–Mar. 30, 1906, 1 v. (39); new series, 16 v. (1–16).

Releases of Mortgages on Personal Property, Index to, 1 v. (1).

Residence, certificates of, Apr. 19, 1907–date, 1 v. (1); Index, 1 v. (1).

Separate Property of Wives, Feb. 13, 1907–date, 1 v. (1); Index, 1 v. (1).

Sole Traders Declarations, Sept., 1909–date, 1 v. (1).

Special ("Limited") Partnerships, Aug. 8, 1906–date, 1 v. (1); Index, 1 v. (1).

Street Assessment Bonds, Oct. 22, 1914–date, 1 v., loose-leafed.

Tax Deeds, July 12, 1906–date, 6 v. (1–6); Index, 1 v. (1).

Transcript of Judgments, Apr. 4, 1906–date, 4 v. (1–4); Index, 2 v. (1–2).

Torrens Act records: Certificates of title, 1908–date, 1 v., containing but eight entries; Record of particulars and receipts for certificates issued, 1 v.; Name index, 1 v. (1); Property index, 1 v. (1).

Tunnel agreements: Stockton street, Mar. 14, 1913, 1 v.; Twin Peaks, May 19, 1914, 20 v. (1–20).

Water, notices of appropriation of, Aug. 13, 1913, 1 v. (1), containing but one entry.

Wills Admitted to Probate, Apr. 19, 1907–date, 1 v. (1); Index, 1 v. (1).

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REPORT

OF THE

State Board of Embalmers
# of California

COVERING

Work Accomplished from September 20, 1915
to November 9, 1916

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO
1917

29364

REPORT OF THE STATE BOARD OF EMBALMERS OF CALIFORNIA.

To HIRAM W. JOHNSON,

Governor of California.

We, the members of the State Board of Embalmers of California. beg to submit the following report of the work done by the board from September 20, 1915, to November 9, 1916:

During the period under review the board comprised the following members: Al P. Booth, president; Wm. H. McDonnell, treasurer; Bessie J. Wood, secretary; A. J. Bradley, member, and I. J. Reynolds, member. The principal office of the board is located at 1955 Telegraph avenue, Oakland, while a majority of the meetings were held at 2198 Geary street, San Francisco.

The first three months were spent in correspondence with all the state boards of embalming throughout the United States with a view to adopting uniform rules for the government of the embalmers in the state, as well as a uniform transportation blank for the transportation of dead bodies.

Licenses were issued to 1,197 embalmers, January 1, 1916, under section 6, Statutes of California, chapter 71, page 80.

The board held a meeting in San Francisco with the secretary of the State Board of Health and the State Registrar for the purpose of adopting a shipping paster. It is a feature of the year's progress, and one great satisfaction to the board, that the paster as submitted found favor with the State Board of Health, the local health officers, as well as the embalmers.

This blank comprises a duplicate of the original death certificate with permit from the local health office attached, transportation permit and embalmer's certificate. It is one adopted by a large number of other states and a movement is now on foot to make it uniform throughout the nation, as is the birth and death certificate.

Records are kept in the office of the secretary of all bodies handled by transportation companies, these averaging over four hundred a month.

A meeting of the health officers about the bay was held in Oakland in reference to the transportation of bodies from one registration district to another and the permits necessary. It was decided that the ordinary burial permit was all that was required when the body was moved from one district to another by private conveyance.

Many protests have been received during the year concerning bodies shipped from state hospitals without embalming. These protests were carefully investigated and as a result the board recommends that the law be so amended that all bodies must be embalmed before they are accepted for transportation.

Many protests have also been received by the secretary of the board concerning the care of bodies by the embalmers. After investigation some of the protests were sustained with warnings to the embalmers.

The secretary has also been called upon to inspect bodies received by transportation companies. It has been found that any accident to an outside box would cause general alarm to the agents in the baggage car. In one case the secretary was notified to meet a body in transit from Denver, supposedly in bad condition. On investigation it was found that the lid of the outside box had become slightly damaged, but that the body was well embalmed.

The shipment of a disinterred body from Nicaragua to San Diego was stopped at the wharf in Oakland for inspection, owing to the absence of necessary papers. It was found that the body was in a metallic case enclosed in a zinc-lined box, and the papers necessary were therefore issued.

Protests have been received concerning embalmers practicing without a license; these have been referred to the district attorney in the county from which received, and reports of same returned to the office of the board.

Notices were sent all the various transportation companies with copies of the rules and regulations regarding shipment of bodies. The board has met with the hearty cooperation of the transportation companies and received from them valuable suggestions regarding the transit permit.

Appeals have been made to the Attorney General for a decision regarding the issuance of a license to a Chinaman, and the decision was given that a person could not be denied a license because of his nativity, in that the law did not so state.

A protest was received against licenses granted Burland Bros. of Watsonville, and the Attorney General ruled that if proof were given that Burland Bros. had complied with the law concerning application for licenses, it was mandatory upon the board to grant same. A meeting was held in San Francisco February 1, 1916, for the purpose of ascertaining the facts in the case, and upon affidavits produced by Burland Bros. that the law had been complied with, licenses were therefore granted.

*The secretary of the board was appointed to represent the board at the meeting of the National Conference of Embalmers Examiners Boards, held in San Francisco October 8, 1915.

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*In October, 1916, the secretary of the board was appointed by the California Funeral Directors to attend the convention of the National Funeral Directors Association and the National Conference of Embalmers Examining Boards which met in Columbus, Ohio.

The board met with representatives of the State Funeral Directors Association in San Diego August 22, 1916. An amendment to the rule governing the shipment of bodies without the state was submitted and is now before the board for consideration.

There have been found many differences in the rulings of local health officers regarding the care of the dead in private vaults, some requiring permission from the State Board of Health, while others, local permission. It is recommended that a uniform rule be adopted throughout the state.

It has also been found that the embalmer has met with difficulty in securing necessary permits when a death occurs in an outside registration district, often occasioning repeated visits for the certificate. It is recommended that the office of County Recorder be a central place for securing permits designated.

The board has investigated the fluids used for embalming purposes and has solicited the aid of the Bureau of Foods and Drugs in securing data needed. It was found that the law would need be amended, compelling the maker of fluids to put the per cent formaldehyde used, on the label of the bottle. The board therefore recommends that a bill be so passed at the 1917 meeting of the legislature.

The board has also found that the embalmers throughout the state have been compelled to secure their knowledge by practical service, as no school facilities were available. There has recently been established a private school of embalming in San Francisco, and through the efforts of the State Funeral Directors Association steps are now being taken to establish a chair of embalming in the University of California. Such a chair is now established in Ann Arbor and other eastern universities.

In view of the fact that the embalmer is in constant contact with diseases in their most dangerous stage, it is recommended by the board that the board have jurisdiction over public and private morgues with the right to inspection, that the public health may be safeguarded at all times.

The board issued a booklet of rules and regulations with a roster of the embalmers, which was distributed to all the embalmers of the state, 20 public libraries, five universities and all the state boards of embalmers.

Report of Treasurer, State Board of Embalmers—Funds Received and Expended from September 20, 1915, to November 9, 1916.

Amount received from the secretary		$6,270 00
Disbursements—		
Salary of secretary, 12⅓ months	$1,000 00	
Office equipment	71 25	
Printing	495 47	
Advertising meeting	15 17	
Traveling expense	159 75	
Postage	221 34	
Stationery	51 24	
Incidental	20 00	
Refund	94 00	
		2,128 22
Balance on hand November 9, 1916		$4,141 78

Report of Secretary, State Board of Embalmers—Funds Received from September 20, 1915, to November 9, 1916.

1,198 license applications by affidavit		$5,990 00	
18 applications rejected		90 00	
16 fees for examination		160 00	
11 applications by reciprocity		110 00	
			$6,350 00
To the treasurer	$6,270 00		
Amount on hand	80 00		
		$6,350 00	

Meetings held	21
Conventions attended	2
Conferences attended	5
Booklets distributed	1,500
Pasters distributed	18,000
Record of bodies shipped	4,806

Report of Bodies Shipped During Year of 1916.

1916	Ireland	Japan	Mexico	China	Hawaii	Canada	South America	Central America	To other states	Within California	Total monthly shipments
anuary	-----	-----	1	13	-----	4	-----	-----	170	291	479
ebruary	-----	-----	-----	7	-----	4	-----	-----	145	231	387
arch	-----	1	-----	6	1	4	-----	-----	185	239	436
pril	-----	-----	-----	7	-----	2	-----	-----	187	240	436
ay	-----	-----	-----	5	-----	4	-----	-----	152	249	410
une	-----	2	-----	4	1	2	-----	-----	144	236	389
uly	-----	3	-----	5	-----	2	1	1	114	277	403
ugust	-----	-----	1	4	-----	4	-----	-----	123	261	393
eptember	1	-----	-----	3	-----	4	-----	-----	104	212	324
ctober	-----	1	1	5	-----	-----	-----	-----	131	216	354
ovember	-----	1	-----	1	-----	4	-----	-----	158	216	380
ecember	-----	-----	1	3	-----	5	-----	-----	154	253	415
Totals	1	8	4	63	2	39	1	1	1,767	2,920	
Total shipments	-----	-----	-----	-----	-----	-----	-----	-----	-------	-------	4,806

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